INDUSTRIAL ARTS and VOCATIONAL EDUCATION

Vol. 24
No. 10

PUBLISHED MONTHLY BY THE BRUCE PUBLISHING COMPANY, 524-544 NORTH MILWAUKEE STREET, MILWAUKEE, WISCONSIN.
Eastern Office: 330 W. 42nd St., New York, N. Y. — Western Office: 66 E. South Water St., Chicago, Ill.

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IN THIS ISSUE

To those interested in the placement factor of vocational guidance, the specific suggestions contained in John T. Shuman's article, "Helping Our Graduates Find Work," will be of especial interest. Lawrence F. Ashley's "Modern School Supervision" contains thoughtful suggestions to the supervisor. Mr. Cramlet's "Teacher and the Home Workshop" indicates the benefits which the shop teacher can derive by associating himself with men interested in the home-workshop movement. The printing instructor will find two very good articles in this issue: the one by R. Randolph Karch on "Accidents and Health Hazards" as applied to the printing trade, the other on "Securing Shape Harmony" by J. Woodard Auble.

The problems-and-projects section contains helpful material for the teacher of practically every type of shop found in the school. Especial attention may be called to the article on "Automobile Brakes and Safety," "Mechanical-Drawing Tests," the two problems on our supplements, the "Jig for Making Commutators for Small D.C. Motors," and the correlation problem presented by the "Drill Press" for the mechanical-drawing room, the patternmaking department, the foundry and the machine shop.

THIS MONTH'S COVER

The picture chosen for the cover this month shows one of the machine shops of the Lane Technical High School, Chicago, Ill. The equipment of this room includes twenty-three 11-in. underneath-belt motor-driven lathes.

Articles Indexed—The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," and "Education Index."

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Subscription Information—Subscription price, $2.50 per year, payable in advance. Canadian postage and tariff, $1.00, foreign countries, 50 cents. Copies not over three months old, 25 cents; more than three months, 50 cents. Notice for discontinuance of subscription must reach Publication Office in Milwaukee, at least fifteen days before date of expiration. Changes of address should invariably include old as well as new address. Complaint of nonreceipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions—The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

The Magazine is on sale at Brentano's, New York; Wanamaker's, Philadelphia; Brentano's, Chicago; Philippine Education Co., Manila, P. I.

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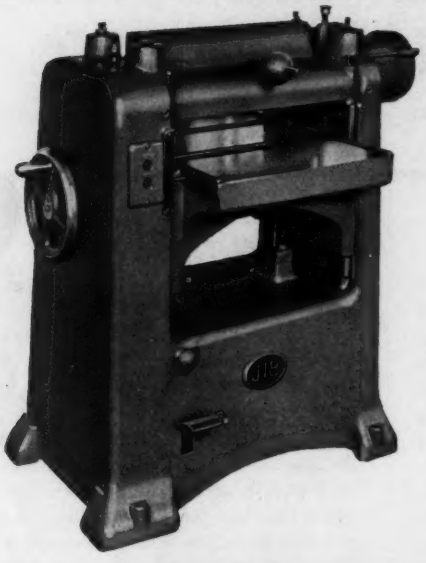

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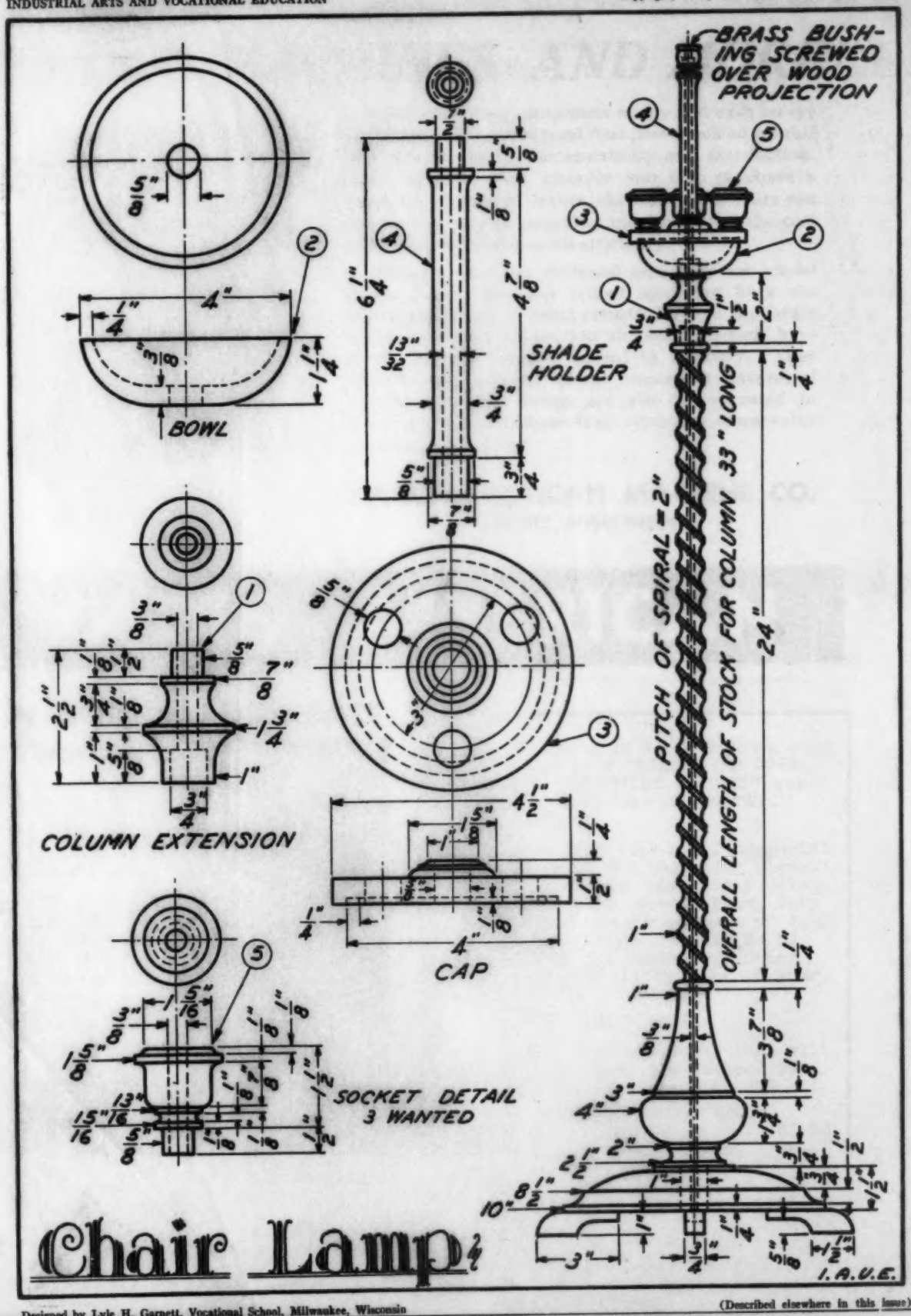
Chair Lamp



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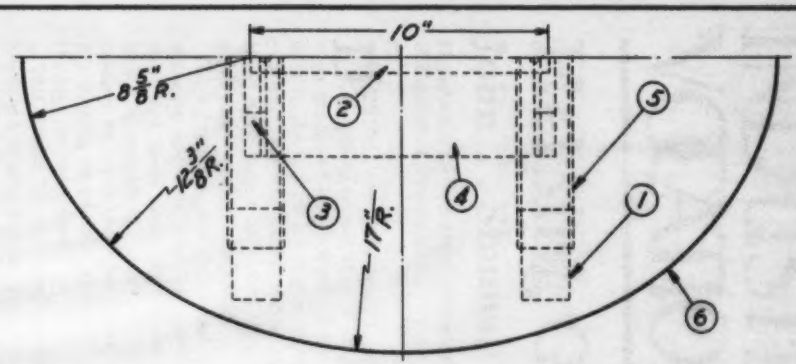

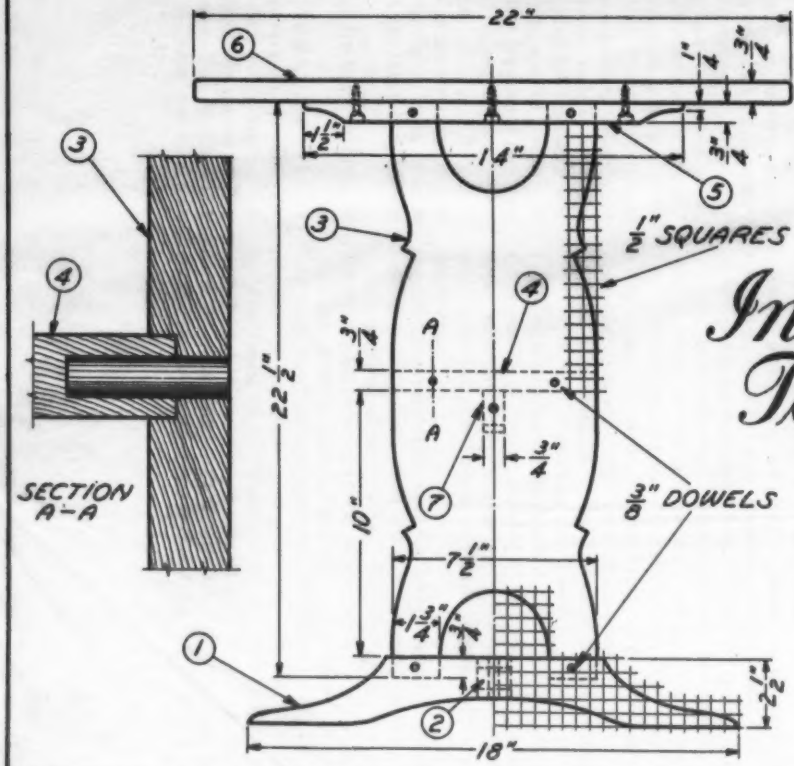

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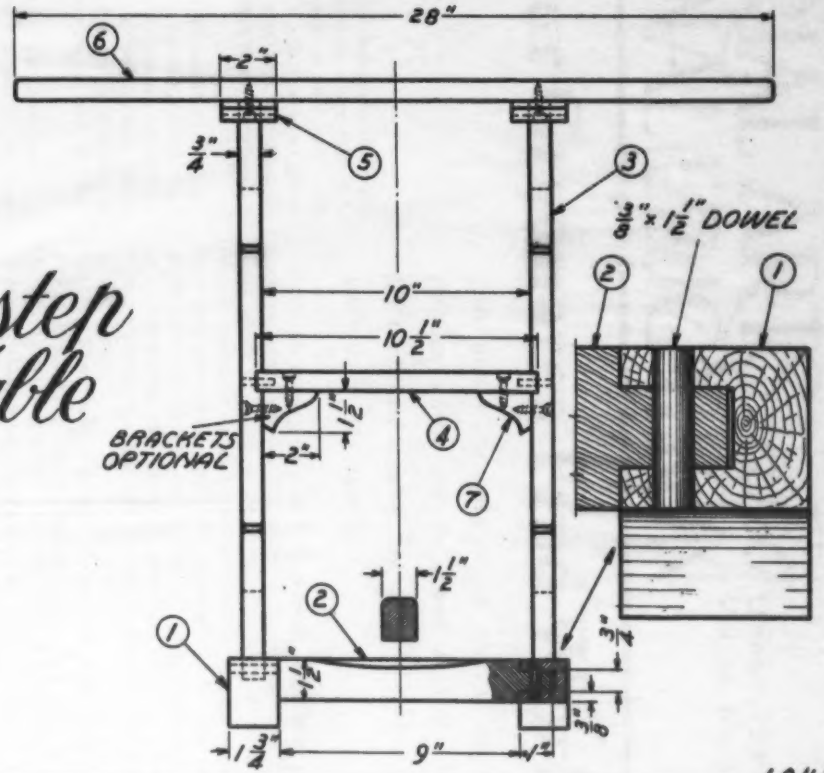

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INDUSTRIAL ARTS and VOCATIONAL EDUCATION
October, 1935
Vol. 24, No. 10

Helping Our Graduates Find Work

John T. Shuman

Department of Industrial Education, Williamsport, Pennsylvania

This article contains some specific suggestions which will be found helpful by those entrusted with the duty of placing students in employment.

DURING the past several years, thousands of young people have lost their jobs and many other thousands have graduated into a world which seems to offer them very little in the way of job opportunities. Further, in most places practically nothing has been done to help them. On the other hand, many things have been done which make their locating a job seem much more difficult.

It is true that our world and our economic systems are changing and that they will continue to change. But these changes, in most cases, are comparatively gradual rather than rapid; consequently, much of writing and talking about changes so rapid that they make any sense of direction in job hunting impossible, show, if anything, a lack of clear thinking on the subject.

This article is addressed specifically to those who are interested in assisting the graduates of our schools to secure work if there is any to be had. Perhaps more than ever before the vocational schools have an unequaled opportunity to "rise above the surface of things" by developing and promoting long-term, sound, and forward-looking programs for unemployed youth and adults. Certainly, it is only by the establishment of superior programs for out-of-school groups that we will prevent the establishment of parallel organizations set up by various mushroom agencies which will attempt to do the same type of work that the vocational schools as regularly constituted governmental subdivisions are already organized to do. Of course, unless vocational education does the job, and does a good job, someone else will do it. Before proceeding with the specific subject of this article, it is necessary that we take cognizance of a few of the many tendencies now evident in the fields of work usually open to young men and women.

First. We must admit that within limits and at a certain time, there are just so many jobs available, it is possible to create a small number of new jobs, but these do not affect the great mass of youth and adults.

Second. There has been a distinct tendency to decrease the proportion of jobs open to youth.

Third. It has become increasingly difficult for youth of average or mediocre ability to secure work which offers any reasonable chance to learn a trade or even a large phase of a trade. The employer will not and usually cannot employ a young man who requires any longer than the absolute minimum length of time in which to learn any given set of skills. It becomes economically advisable and possible, in many cases, to hire only those outstanding enough to grasp the required work quickly, or skilled enough to earn much of their pay from the beginning.

Fourth. The preceding paragraph leads us directly to the situation that many jobs are now filled with men superior to those formerly in them. As this process continues, we find converging at the bottom of the ladder, a great mass of humanity — poorly trained, ill-educated people, competing for such low-grade jobs as are available.

Fifth. In many cases, we find excellent apprentice programs in operation, but the program of apprentice training about which we heard so much recently, seems to hold out no hope whatever for the great numbers of youth who want work and who could readily be prepared for it. The truth of the matter is that in many fields of work, apprenticeship as an institution has ceased to exist; and to try to revive it to its former state is like trying "to bring back to life a dead horse."

Sixth. There will probably develop in this country a distinct tendency to bring together under one organization the functions or services of guidance, employment, and vocational training and retraining. In a few scattered situations, this has already been done by and in co-operation with the public schools. In a great many more cases, public employment systems and other organizations have been talking about effecting such movements. The point that the writer wants to emphasize here is that the public schools through their vocational departments are strategically situated to carry on this threefold task perhaps better than any other organization or group of organizations. However, a considerable part of such a venture must always be carried on in co-operation with other existing agencies.

The Functions of a Public-School Employment Service for Youth

The type of organization possible and advisable for offering assistance to young people or to adults in finding employment, naturally depends upon the local situation. Perhaps only three principles might be made dogmatically in this connection:

1. Such an organization cannot be conducted in the same routine manner as are many adult employment agencies.
2. Regardless of the size of the community, some one individual should be in charge of the work.
3. The program must be planned as a long-term program, free from interference by politics. Probably one of the chief reasons for our state employment services in some states not functioning to better advantage, is a political one.

If the school situation is a small one, then a teacher can be relieved of other extracurricular activities and given charge of such work. On the other hand, a larger situation might warrant a full-time personnel. Regardless of anything else, however, it is highly important that all pupils and all graduates be able to look to one individual as having charge of that work. People will always avail themselves of a service more frequently if there is some designated individual to whom they can go.

Any employment service for youth has six definite functions to perform, namely:

1. Guidance.
2. Keep up the morale of the clients.

3. Teach the clients how to look for work.
4. Co-operate with all public agencies advisable.
5. Job placement.
6. Follow-up.

Guidance. To be of any value, guidance given most out-of-school individuals must be definite and specific rather than general; it must be possible of attainment by the individual, both financially and mentally; and the objective must be possible of achievement within a reasonable length of time. Vocational guidance, at least, should be an integral part of any employment program. Too often, however, we do not place our guidance activities where they belong. It is important that guidance activities be closely "tied up" with related activities as much as possible rather than placed within the four walls of an isolated classroom as is so often the case. Further, unless a person is in constant touch with business and industry, he is not qualified to give guidance to these youths who are in the process of making vocational decisions.

Keep Up the Morale of Youthful Clients. It has been estimated that it requires an average of about three months to find work for the individual of average personality, training, physique, and mental ability. The estimate of three months certainly is not too high, and only when we consider the number of young people who go for six months, ten months, or even more than a year without finding work, do we realize the magnitude of the task and the necessity of maintaining the morale of these young men and women.

Some consider it a good plan to have these young people come into the employment office at definite intervals every few weeks to talk things over. Trial interviews, in which the employment situation between the employer and the applicant is enacted, can also be very helpful to them. At any rate, give them something to do which will help them use their energies to improve themselves. For example, this last fall one boys' club, consisting of high-school graduates and operated as an evening-school activity, started with a mere handful, and before the end of the winter boasted a membership of about 150 members. These young men met as a group for business and social purposes one night a week, and then on other nights divided themselves into interest groups. These interest groups ranged from one interested in music to one interested in training for specific jobs, and another preparing for definite civil-service examinations. It is almost superfluous to say that such a club maintained the morale of these out-of-school youth, and kept them constantly in touch with the school authorities who were thus better able to help them locate work.

Teach the Young People How to Look for Work. Most of us are inclined to forget that if he knows how to proceed, an individual can usually find work for himself quicker than most employment agencies can do it for him. If that is even partly true, then it certainly is the duty of every employment office to teach its clients the technique of finding a job.

Placing Graduates on Jobs. Every man who works with unemployed people learns to use many devices or "tricks of the trade" to expedite the placing of people on payroll jobs. In the following paragraphs, a few of these devices are given. Many more might be added, but those listed have proved feasible and practicable in actual situations within the experience of the author.

1. *Recommend for jobs only those who are ready to go to work — those who possess the necessary training and skills so that they can give a good account of themselves.*

Remember that in employment work, one mistake will destroy years of hard, conscientious endeavor. If a particular individual is not ready to go to work, then he should prepare himself for some particular type of work at which he has some possibility of securing employment. Above all, there is little place for sentiment in the recommendation of individuals for employment. Perhaps the two examples which follow will make clear one or two points:

Many stenographic students who have done very mediocre work in day school can easily attain a high degree of skill in evening school. Other students who have graduated, but who have not located work, should attend evening-school classes to retain such skill as they have already acquired and to improve themselves wherever possible. It seems rather foolish to encourage a boy or girl to spend several years acquiring certain skills and then, because no job is forthcoming immediately after graduation, to let that ability and skill find its way into the land of forgotten things.

Jim, who graduated from an eastern university, found a job in an accounting department, was married, and then lost his job after a year because the company went into bankruptcy. Somehow, Jim found his way back to the local high school from which he graduated. His case was analyzed. It was found that even though he had majored in accounting and had worked at it, he still could not operate a calculating machine or a slide rule. Jim started immediately to learn the operation of these mathematical aids. Later it was learned that a local firm was looking for a young man who could conduct some simple research work. The research required a working knowledge of physics and the use of the calculator or slide rule. After another week of intensive work, Jim was sent after the job, and secured it.

2. *Get the individuals you help find jobs to tell you about any possible future openings.*

It is a rather frequent occurrence in an employment office which has the confidence of its clients, to have Howard Smith call on the phone to tell you that the boss is inserting an advertisement in tomorrow's paper for a stenographer or a shipping clerk. An advance notice like this, more often than not, results in a placement.

For effective placement work, you must learn about vacancies before they occur.

3. *The employment officer or co-ordinator of the school should be placed on public employment and personnel committees.*

It is well to remember that often more jobs are found across the table at a committee luncheon than are found in the office at the plant. The schoolman who has charge of employment work in the schools should be placed, if possible, on the chamber of commerce employment committee or other local committee if for no other reason than to put him on a more equal footing with the men he must meet.

Frequently, such positions go to the superintendent or to the local vocational director, but if those superiors are not handling the employment work of local public schools, then they have no business on these committees unless they must be there to make decisions which carry with them the weight of authority.

4. *Secure trial interviews with employers.*

If it is at all possible, arrange to have certain employers interview likely prospects even though they have no intention of hiring anyone at that time. After the interview, have the applicant report back to you, and then you, in turn, should check with the employer. Few employers will refuse two such interviews a week, and out of them, you can secure such things as:

1. A knowledge of the employer, his likes and his dislikes.
2. Valuable knowledge about your applicant which will help materially in any guidance.
3. A list of applicants which you know are acceptable to the employer. This list considerably reduces the time you need to supply the employer and the guesswork involved.
4. Often the employer will take a liking to an applicant and hire him when it is least expected.

Do not ask the employer to fill out any forms. Check with him personally.

5. *Make calls on the employer only when you have something definite to say or do.*

It is poor policy for any public agent merely to "drop in for a chat." Have something to contribute to the job of the other man whenever you call.

6. *Use photographs on your records and in talking to employers.*

1. It is easier to remember a photograph than a name. Small photographs, therefore, are very helpful when placed on the master office records.

2. When contacting employers, you will find it very helpful to carry with you in a pocket notebook the records and photographs of perhaps ten to fifteen students who are seeking jobs. Small 1 by 1½ or 2-in. photographs can be produced inexpensively by any employment office. Notice how this device worked in one case.

The manager of a paper-box factory had been "fooling around" for several weeks interviewing girls for an office position. He couldn't be satisfied. One day, during a conversation in this man's office, the school co-ordinator pulled from his pocket such a notebook containing the photographs and records of five girls. The employer asked to see three of the girls. He immediately hired one of the three.

7. *Secure and use publicity that employers will read.*

It is probably better to use as little newspaper publicity as possible, unless it is used very intelligently.

It is possible for most wide-awake public-school employment offices or vocational schools to become clearing houses for confidential information concerning the local labor situation. Mimeographed bulletins might be mailed to co-operating employers once a week or once every two weeks. These bulletins might give information as to how individual plants are operating and what the prospects are for the immediate future. Such bulletins are to be mailed only to those employers who co-operated in furnishing this information, or to anyone designated by such employers. These bulletins are usually read and so, too, would any publicity that is incorporated in such a bulletin.

One such bulletin has always carried with it one page calling the attention of the employer to a small number of individuals recommended for employment. The placements of those mentioned in this bulletin have run up to 85 per cent.

8. *Help your graduates locate work in related fields or get them to combine different skills in looking for a job.*

Recently an employment officer and vocational counselor in a rather large school district, said to me that he simply did not bother with those graduates whom he could not place in the trade which they studied. Perhaps he did not have the time, but regardless of that, such an attitude on the part of such an official is certainly wrong.

It is rather tragic, but true, that those seeking employment seldom tap even a majority of the sources from which employment might come. To help them would require a careful analysis of each individual and of the local employment situation, and this we have thus far usually failed to do. In the next few examples, notice how this works out.

Several unemployed graduates of a machinist course were placed on temporary work in a department store putting together toys for the Christmas trade. After putting these toys together, two of them were retained as clerks to sell those same toys.

Graduates of cabinetmaking courses are sometimes placed in packing and shipping departments because of their training in the handling of wood.

Some 25,000 nurses are graduated in this country every year, but approximately only 6,000 to 8,000 manage to secure work in their field. In some of our evening schools, you can easily find a number of these nurses taking stenographic work. Why? After they have trained themselves as stenographers, they usually manage to find work in a physician's, a dentist's, or an industrial office, because of their combination of nursing and stenographic skills.

In other places today, many girls, graduates of home-economics courses, are finding work opportunities behind lunch counters, or as waitresses in restaurants.

9. *Train the graduates to handle the more skilled jobs.*

It is always easier to place a toolmaker than it is to place a machine operator; similarly, it is easier to place a machine operator than an unskilled laborer. Encourage intensive vocational training for payroll jobs for those graduates who are ready for it and who possess the requisite ability. For example: A plant could not locate an adequate supply of sufficiently skilled workers to be used in the manufacture of a variable-pitch airplane propellor. Men doing the machine work in this plant had to produce work that was extremely accurate. A group of high-school graduates who had made good records in their high-school machine-shop work and other industrial courses were given very intensive training in preparation for jobs in this propellor plant. Practically 100 per cent of the boys in this group were placed on jobs and have since been regularly employed.

10. *Employment and guidance service should be in operation the year round.*

If we expect employers to use our service, then we must operate the year round on a twelve-month basis and for a full working day.

In a discussion of this kind it is possible to touch on only isolated instances and some of the more prominent ideas. It seems, however, that we can no longer afford to waste the energy and the valuable years of thousands of our youth by not assisting them until they have found their niche in the business or industrial world. Any program designed to achieve this end must work through already existing agencies and must be planned more or less permanently over a long period of time, and it must also be a matter of slow and continuous development. Temporary and so-called emergency programs will eventually result in more harm than good unless they are extremely well administered.

For the vast majority of youth a job is a vocational, an economic, and a moral necessity. If we wish to help these graduates at a time when our services can be most effective and valuable, then let us do a little less talking and honestly tackle the problem.

Modern School Supervision

Lawrence F. Ashley

Columbus, Ohio

This article, while general in nature, contains much that will be of interest to those entrusted with the duty of supervising the industrial arts and vocational education.

What is Supervision?

THERE is no true supervision without administration, and conversely, there is no true administration without supervision in spite of the numerous time-wasting debaters who would read various shades of meaning in the two terms. In keeping with this thesis, the following discussion will refer to those duties of the head school officer subject to the authority of the board of education as belonging to the supervisor, or if one prefers, the administrator. This head school officer is usually the principal of the school. He may have assistant supervisors or administrators where the size of the school system warrants. However, it is not the position

of the head school officer that is of major concern, but his duties and responsibilities, and how he interprets them for the benefit of the children of the school.

One can no longer look at an individual and decide almost wholly from physical appearance that he will be a first-rate school leader. We now recognize that the supervisor must be aware of many things, not the least of which are criteria for maximum learning and teaching. That is to say, he must know what constitutes a good school. He must know in terms of the most approved developments what children should learn, how children learn, and what is conducive to adequate learning results. It follows that he must know the function of the teacher in the learning process in the light of latest research, and to this end will devote an increasing care to the what, why, and how of modern teaching. As of old, successful supervision continues to imply a general knowledge of school laws and finance. More important, however, is the recognition of the interdependence of school and society, and the ability so to direct the affairs of the school that there be the minimum waste time and effort in attaining such school outcomes as are compatible with the needs of life.

Changing Views of Education

"Two generations ago," says Ervin Lewis,[1] "the prevailing idea of education was in startling contrast to the ideas now generally accepted. Old fashioned education made little or no attempt to understand children." Then it was the business of the head school officer to see that physical and mental discipline were maintained through the administering of periodical doses of the three R's, sweetened, if necessary, with the birch rod. Management was militaristic. There were the traditional subjects to be taught in a mechanized routine. The emphasis was upon subject matter and not upon pupil progress. The primary requisites for a principal under the old scheme were a good physique for physical mastery, and a knowledge of general routine and traditional subject matter. Unfortunately, these qualities still prevail as the major requisites for head school officers in many parts of our country.

Antecedents of the new order can be traced as far back as the teaching of Plato, but it was necessary for an awakening industrial civilization to give it motivation. If one is interested in following the generation of the forces which have had most to do with the enlightenment of school leaders, he needs but study the pages of the works of Comenius, Rousseau, Pestalozzi, Froebel, Baldwin, Dewey, and a host of contemporaries and followers of the latter. Through them one will see how psychology has come into increasing importance in establishing or determining child interests and abilities, as well as course content and method in keeping with them, and in keeping with individual and social goals.

In addition to a knowledge of the antecedents of general education, as a basis for the interpretation of modern supervision, the supervisor must also be aware of the major principles underlying social psychology. Finney[2] has summarized these as follows: (1) Social entities are mental entities. (2) The social process is a product of the learning process. (3) The learning process is usually a social process. (4) Self and society are two phases of the same thing. (5) Personality is a product of the learning process. (6) There is a basic sameness of all personalities in the same social environment. Through a consideration of these or similar principles and the antecedents referred to above, there have evolved changed conceptions and procedures. Here again, Lewis[3] has shown these in striking contrast to the old education as follows:

The Old Education Was:	The New Education Is:
1. Highly conventional and traditional	1. Largely disregarding conventions and traditions
2. Mostly static	2. Progressive, dynamic, creative
3. Very formal	3. Highly informal
4. Quite autocratic and dictatorial	4. Very democratic and cooperative
5. Telling and drilling	5. Developmental and guiding
6. Relatively passive mentation	6. Largely active mentation
7. Pouring in and absorption	7. Continuous growing through self-activity
8. Mostly memoriter	8. Mostly independent thinking
9. Preparation and learning for some future time in life	9. Learning for the solving of immediate problems
10. Militaristic and disciplinary	10. Freedom, liberty, spontaneity
11. Adjustment	11. Continuous readjustment
12. Elevating the masses	12. Developing the individual

The growing complexity of the duties of the head school officer become obvious as well as his importance to the organization in interpreting change and in building new patterns of ideology for the school.

Duties of the Administrator

As might be inferred, the school of tomorrow will have little use for the absolute autocrat, which many schools of the past have known, for the principal or superintendent. Instead, there is need for a skillful co-ordinator of ideals or policies and of people and materials. As Lewis says:[4] "Administration [Management] is the art and science of creatively integrating ideas, materials and persons into an organic harmonious working unit for the achievement of desired goals." This all-inclusive definition must necessarily be broken down into many specific areas of activity for the administrator if one is to understand the full implication of it. However, this breakdown of activities can be done properly only when faced with given situations, and in the light of existing conditions. Hughes[5] has listed the large round of duties which fall to the lot of the average superintendent from the hiring and dismissing of teachers, to the looking after of property and materials, the clerical duties, and his responsibilities to the community. What is of greatest importance, however, is the interpreting of goals to be attained, and the selection of and co-operation with, teachers to attain them.

Selecting Teachers

To find an artist teacher for every room is the duty of the administrator. To this end, the board of education must co-operate by furnishing the necessary funds to justify the services of such a teacher. The superintendent should have at hand certain criteria for making his selections. Barr[6] suggests this list:

1. Ability to stimulate interest
2. Wealth of commentarial material
3. Attention to pupils while reciting
4. An effective organization of subject matter
5. Well-developed assignments
6. Use of illustrative materials
7. Provision for individual differences
8. Effective methods of appraising the work of the pupil
9. Freedom from disciplinary difficulties
10. Knowledge of subject matter
11. Knowledge of the objectives of education and smiles

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[1]Lewis, Ervin E., and Williams, Oscar R., *Creative Management for Teachers* (Ann Arbor, Michigan: Edwards Bros., Inc., 1931), 254 pages. See page 30.

[2]Finney, Ross L., *A Sociological Philosophy of Education* (New York: Macmillan Co., 1928). See pages 49–71.

[3]I n 1, page 15.

[4]*Ibid.*, page 131.

[5]Hughes, C. L., "The Functions of the Superintendent in Theory and Practice," *American School Board Journal*, February, 1928.

[6]Barr, A. S., *Characteristic Differences of Good and Poor Teachers* (Bloomington, Illinois: Public School Publishing Co., 1929), page 117.

12. Conversational manner of teaching
13. Frequent use of the experience of the pupils
14. An appreciative attitude, evidenced by the teacher's nods

One sees in this list effective criteria for the selection of teachers for the refined type of traditional school, but there are certain other characteristics which are needed. The artist teacher must have versatility based upon a background of training and skills and which will enable him to lead children to a participation in the selection of subject matter. Specifically, he must know how to develop units of work involving the maximum interest and at the same time attainment of knowledge on the part of the pupil. In addition to this background for the preparation of his task, the teacher should have a personality such as will inspire children to respectful action coupled with the joy of doing. The difficulty of the supervisor's position may readily be seen if he is limited financially in securing the best possible talent. Having selected suitable teachers, it then becomes the duty of the supervisor to co-operate with them in carrying out their plans, and in trusting them in a share of policy-making. In other words, good teachers must have free reign in developing their work and must be allowed to share in the administration of the school.

Teacher Participation in Supervision

There are now many phases of management which must lie with the individual teachers. Supervisors have been tardy in recognizing that as the major responsibilities of child training must lie with the individual teacher, policies of management should grow largely out of teacher needs. In line with this thought, Updegraff[7] points out:

1. A committee of supervisors or principals is not so good as a committee of teachers, and that neither is as good as a committee on which all are represented.
2. Any plan is much strengthened if formal agencies are provided by means of which committees can ascertain the attitude of teachers whose work is covered by the proposed cause.

Aside from the effectiveness of the school program through the active participation of the teachers with the principal in formulating procedures, the *esprit de corps* among the staff is greatly enhanced. There is noted a general interest in the whole school, and in one another, which the teacher could not have under the autocratic form of administration.

Finally, it becomes the duty of the supervisor, through the participation of teachers, pupils, and patrons, so to organize the school that it will be a harmoniously working organism, in which all activities are interacting and co-operating for the common goal. This goal has been broadly stated as the reconstructing of the child's experiences into usable life patterns. The interpretation of all that is involved in attaining the purposes of the school must likewise be a co-operative matter in which certain principles will be mutually recognized as guiding criteria. Collings[8] suggests the following principles:

Education as absorption has nothing to do with education as growing. One is active, the other is passive; one is expression, the other is repression; one is doing, the other is pouring in; one is activity, the other is reproduction of facts; one is purposeful, the other is purposeless; one proceeds from an inner drive, the other from an outer drive; one is creative, the other is a study of ready-made products; one is guidance, the other is dictation; one enhances individual differences, the other retards them; one encourages thinking, the other encourages memorizing; one makes subject matter a means, the other makes it an end.

With the passing of the stereotype factory-product traditional school, must go autocratic outworn types of supervision. In their place will be substituted a more flexible, co-operative, more progressive plan concerned with maximum pupil growth.

[7]Updegraff, Harlan, "Participation of Teachers in Management." *National Education Association Proceedings*, 1920, page 183.

[8]Collings, Ellsworth, *School Supervision in Theory and Practice* (New York: T. Y. Crowell Co., 1927), pages 24–25.

Teacher and the Home Workshop

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The home-workshop-guild movement is attaining ever-increasing importance. Shop teachers, by contact with men interested in this movement, can gain both publicity and acceptance for the industrial-arts work offered in the school.

THE home-workshop organization has grown decidedly during the past year. When the first workshop guilds were organized, it was thought by many to be only a passing fancy. There are indications, however, that the home workshop is going to offer a permanent solution for the problem of how to use leisure time properly. This is exactly in accord with two other moves quite evident at the present time. One is that of adult education, and the other is the expenditure of governmental relief money. Supervised playgrounds are calling for a definite program of craftwork for both adults and children. Considerable emphasis and stress are being placed by many organizations on craftwork. Boy scout camps, Y.M.C.A. camps, church camps, and many others are organizing clubs such as nature clubs, hiking clubs, airplane clubs, model boat clubs, toy clubs, general craft clubs, garden clubs, book clubs, stamp clubs, and numerous other types of clubs. These general trends are in evidence in all communities. Outstanding people with ability to organize are promoting them and, without doubt, the general response from all walks in life would indicate that the plan is a solution to one of our social problems.

The foregoing statements would indicate current trends, and should lead industrial-arts teachers to realize that this is a nook in the general scheme where they fit in admirably.

Careful study shows that the home workshop offers the industrial-arts teacher two very definite benefits. First, there is a social benefit. Second, the actual information which he may acquire from a skilled hobbyist. The social advantages of the industrial-arts teacher are rather limited unless he himself makes some effort to affiliate with men's organizations which will bring him in contact with the outside business and professional world. The actual setup for the usual teacher is not conducive to this. His daily schedule is long and strenuous. He also is called upon to use his hours after work for the promotion of outside school activities which bring him again in contact only with students. If such a teacher is not careful, he will become self-conscious and feel that he is incapable of effectively meeting people outside of his profession. Perhaps it is more essential that industrial-arts teachers have a diversified knowledge of what constitutes life for various professional and trades men, than teachers in some other educational fields. Students will come to the

industrial-arts teacher and converse with him relative to future occupations. Invariably their conversation will lead to what a man needs to know in order to carry on successfully certain occupational livelihoods. A home-workshop organization of fifty men may easily represent fifteen or more professions, trades, or occupations.

Considering the second point, that of actual information gained from contacting members of home workshop organization, it becomes evident quickly that industrial-arts teachers gain greatly by visiting the workshop of these home-crafts enthusiasts. The writer could enumerate dozens of clever ideas, designs, methods for doing certain jobs with limited facilities, that have been acquired from visits to home workshops. Many of these ideas may be passed on to the students in the school shop, thus, in the end, bringing about very effective results. These visits to home workshops will disclose men who are interested in repairing clock cases and clock works, others interested in fishing tackle, still others in archery; then there are those who delight in building, in carving, in making articles of rock or cement, in constructing furniture, toys, knives, novelties of horn, in tanning hides, making small machines, and so on.

In addition, these visits give the teacher an opportunity to observe how effectively some of the things taught in the public schools are carried over into actual life. The school may learn much by making this check-up of the carry-over of its work and its influence on people's lives.

Shop teachers need diversity of experience. The greater the number of people they meet outside of their own field, the more they read, the more they observe the expertness of others, the more meaning, the more color, the more interest there will be in their own lives. People who complain of the dullness of life, have simply allowed internal energies to stagnate.

Education is an accumulative process. The home-workshop guild offers unlimited possibilities for the shop teacher who wants to become acquainted with the problems and personalities in all walks of life. Such a teacher can only gain by joining existing organizations of this kind in his community, or by promoting such organizations if they do not exist.

The Functions of Co-ordination—III

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The conclusion of this study on the functions served by co-ordination in continuation-school work.

(Continued from the September issue)

Curriculum Services

Adequate instruction in continuation or part-time education depends very largely upon the vitality of the materials in the course of study. All teaching is directed toward the achievement of habits, attitudes, and ideals. To accomplish this end with the greatest ease and the least possible expenditure of time is one of the real aims of teaching. Two factors contribute toward this end: (1) the curriculum, and (2) the method of organization and presentation of curricular materials.

Three factors bear upon the nature and value of the curriculum: (1) the present mentality of the pupils; (2) the maturity of the pupil in terms of experience, and (3) the relation of the curricular materials to the habits, attitudes, and ideals to be fixed.

The co-ordinator is particularly concerned with the third factor — the relation of the curricular materials to the ends to be achieved. His visits to the homes of the pupils and the employers of the pupils, and his general understanding of the vital activities of the community, contribute much toward his ability to select subject matter of real value to the pupil. Since the school hours of part-time students are so few, it is necessary to give as much as possible of real value to the pupil. In other words, it means that both curriculum and method must be as rich as can be made.

Co-ordinators, so far as their curricular service is concerned, seek to accomplish the following things: (1) to keep the course of study alive by the addition of new materials from the field; (2) to prepare and revise courses of study; (3) to help adapt instructional materials to the needs of the pupils; (4) to prepare instructional materials from raw experiences; (5) to study the effect of experimental or trial course of study, and (6) to make job analyses for instructional purposes.

TABLE VI. Showing Vote in Percentages on Certain Curricular Services of Co-ordinators

Activities	*Very Important*	*Important*	*Not Important*
1. Keep course of study alive by addition of new materials.			
Total Teachers	86	10	5
Total Experts	92	8	0
2. Prepare and revise courses of study.			
Total Teachers	77	13	3
Total Experts	92	8	0
3. Help adapt instructional materials.			
Total Teachers	76	17	3
Total Experts	92	8	0
4. Prepare instructional materials from raw experiences.			
Total Teachers	69	21	5
Total Experts	92	8	0
5. Study experimental trial of curricular material.			
Total Teachers	64	29	2
Total Experts	58	25	17
6. Make job analyses for instructional purposes.			
Total Teachers	54	29	10
Total Experts	67	25	8

The most vital activity in this group is that of keeping the course of study alive by the addition of new materials from field experiences. Eighty-six per cent of the teachers and 92 per cent of the experts rated the item very important, 10 per cent of the teachers and 8 per cent of the experts rated it as important, and 5 per cent of the teachers and none of the experts thought that it was not important.

The work of preparing and revising the course of study is the second most important activity. Here 77 per cent of the teachers and 92 per cent of the experts gave a rating of very important, 13 per cent of the teachers and 8 per cent of the experts gave it a rating of important, and 3 per cent of the teachers and none of the experts felt that it was not important.

Co-ordinators are expected to help adapt the instructional materials to the needs of the pupils. Seventy-six per cent of the teachers and 92 per cent of the experts rated this item as very important, 17 per cent of the teachers and 8 per cent of the experts rated it as important, and 3 per cent of the teachers and none of the experts rated it as not important.

The preparation of instructional materials from raw field

experiences is also an important task of the co-ordinator. In other words, 69 per cent of the teachers and 92 per cent of the experts rated the item as very important, 21 per cent of the teachers and 8 per cent of the experts rated it as important, and 5 per cent of the teachers and none of the experts rated it not important.

The last two items, as shown in Table VI, are rated very close together. The study of experimental trials of curricular materials when rated by the teachers or by the combined rating is more important than making job analyses. However, the experts give a higher rating to the latter item. The first item is given a rating of very important by 64 per cent of the teachers and 58 per cent of the experts while the second item is rated as very important by only 54 per cent of the teachers. The experts give the same item a rating of very important by 67 per cent.

Judged from all angles, the curricular service is the most important of all the activities of the co-ordinator. In actual practice, as will be shown later, it does not appear so important.

Relationship with Other Teachers

A satisfactory system of co-ordination service must provide for a free and practical type of relationship between those who make the visits to the homes and places of employment of continuation-school pupils and the classroom teachers. Even where teachers do their own co-ordinating work, there must be free and effective contact provided with other teachers who have the same pupils part of the time. These contacts with the other teachers should seek to accomplish the following: (1) to give other teachers the benefits of the visit so far as the work of the pupil is concerned; (2) to help adapt new instructional materials to the needs of the pupil as revealed in the conditions at home and in the shop; (3) to reveal to the other teachers the nature of the conduct of pupils in the home and place of employment; (4) to bring to other teachers new curriculum materials found in the home and the shop; (5) to make written reports on the outcomes of the visits so that all concerned might profit by the visit, and (6) to help other teachers make progress charts.

TABLE VII. Showing Percentage Vote on Certain Relationships with Other Teachers by Co-ordinators

Activities	Very Important	Important	Not Important
1. Hold conferences regarding pupil's work.			
Total Teachers	64	23	8
Total Experts	67	17	8
2. Hold conferences regarding adaptation of course of study.			
Total Teachers	56	33	6
Total Experts	50	33	8
3. Hold conferences regarding pupil's conduct.			
Total Teachers	41	40	10
Total Experts	25	67	0
4. Hold conferences regarding new curricular materials.			
Total Teachers	37	43	13
Total Experts	33	50	0
5. Making of written reports for general files.			
Total Teachers	31	46	11
Total Experts	33	25	25
6. Making progress charts.			
Total Teachers	17	33	37
Total Experts	17	33	42

Holding conferences with the teachers regarding the work of the pupils was given a rating of very important by 64 per cent of the teachers and 67 per cent of the experts; it was given a rating of important by 23 per cent of the teachers and 17 per cent of the experts, and a rating of not important by 8 per cent in each group.

It is felt that co-ordinators should adapt the course of study to the needs of the pupil. This is shown by the fact that 56 per cent of the teachers and 50 per cent of the experts gave the item a rating of very important, 33 per cent of each group gave it a rating of important, and 6 per cent of the teachers and 8 per cent of the experts rated it as not important.

The conduct of the pupils at home and at work is an important subject for conferences between the co-ordinator and the other teachers. Forty-one per cent of the teachers and 25 per cent of the experts gave this item a rating of very important, 40 per cent of the teachers and 67 per cent of the experts gave it a rating of important, and 10 per cent of the teachers and none of the experts pronounced the item not important.

Holding conferences with other teachers regarding new curricular materials is of only secondary importance as viewed by both teachers and experts. In other words, only 37 per cent of the teachers and 33 per cent of the experts rated the item very important, 43 per cent of the teachers and 50 per cent of the experts rated it important, while 13 per cent of the teachers felt that it was of no importance.

Teachers, as a rule, recognize the value of written reports to a greater extent than do the experts. Thirty-one per cent of the teachers rated the item as very important, and 46 per cent rated it important, while 33 per cent of the experts ranked it as very important, 25 per cent, important, and 11 per cent of the teachers and 25 per cent of the experts gave it as their opinion that written reports were not important in the work of co-ordination.

Making progress charts is not a popular activity in co-ordination as viewed by both teachers and experts. Only 17 per cent in each group gave the item a rating of very important, 33 per cent in each group rated it as important, and 37 per cent of the teachers and 42 per cent of the experts thought that making progress charts was not important in the work of co-ordination.

Taking the above data as criterion, one is forced to conclude that however highly one might regard the problem theoretically, it is not an important activity of the co-ordinator. Both practice and opinion seem to bear out the above conclusion. Only one item in the list stands out as worthy of much consideration and that is *holding conferences regarding the work of the pupil.*

Miscellaneous Activities

Three miscellaneous activities are often carried on by co-ordinators: These are: (1) helping with supplies and equipment problems; (2) keeping close contact with the probation officers, and (3) carrying on correspondence with parents and employers.

Table VIII shows that 19 per cent of the teachers and 42 per cent of the experts gave a rating of very important to the item helping with supplies and equipment problems. Forty-three per cent of the teachers and 25 per cent of the experts gave it a rating of important, and 29 per cent of the teachers and 33 per cent of the experts rated the item as not important.

TABLE VIII. Showing Percentage Vote on Rate of Importance of Certain Miscellaneous Activities of Co-ordination

Activities	Very Important	Important	Not Important
1. Helping with supplies and equipment problems.			
Total Teachers	19	43	29
Total Experts	42	25	33
2. Keeping close contact with probation officers.			
Total Teachers	41	40	11
Total Experts	33	33	25
3. Correspondence work.			
Total Teachers	27	36	23
Total Experts	25	17	50

Co-ordinators are expected to keep a close contact with the probation officers. This fact is supported by the survey which shows that 41 per cent of the teachers and 33 per cent of the experts rate the item very important, 40 per cent of the teachers and 33 per cent of the experts rate it important, and 11 per cent of the teachers and 25 per cent of the experts rate it as not important.

Co-ordinators are not expected to carry on correspondence as part of their co-ordination work. This is shown by the fact that only 27 per cent of the teachers and 25 per cent of the experts rate the item as very important, 36 per cent of the teachers and 17 per cent of the experts rate it as important, and 23 per cent of the teachers and 50 per cent of the experts state that the activity is not important in the work of co-ordination.

General Conclusions

It may be safely concluded that co-ordination is one of the most vital activities of the continuation school. The philosophy of the school is based very largely upon the importance of personal contact with the home and the employment of the pupils. Many cities require that from one fifth to one half of the time of all teachers in continuation education be spent in co-ordination work. Others require the full time of one or more specialized workers to carry on this part of the work of continuation education.

The literature dealing with continuation education, although not plentiful, emphasizes co-ordination service. Much of this literature does not attempt to analyze the work of co-ordination, but it does give it an important place in the part-time-education program.

The survey of the importance attached to the various activities which are or might be performed by co-ordinators indicates that the major activities performed by co-ordinators rank in order of importance and worth as follows: (1) enrichment of the curriculum by information gathered on visits to the homes and places of employment of the pupils; (2) visiting parents for the purpose of securing a better understanding of home and environmental conditions; (3) visiting places of employment for the purpose of understanding employment conditions; (4) placing and maintaining pupils in proper employment; (5) rendering larger and larger community service; (6) holding conferences with other teachers for the purpose of passing experiences on to them which have been obtained in their visits; (7) rendering effective publicity service for the school, and (8) rendering certain miscellaneous services for the school.

Foreign Wood Carving—III

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In this article, the author describes some of the carving in the round done in schools of foreign countries.

THE types and styles of carving given in the two previous articles were devoted entirely to carving in relief, or carving in two dimensions on a flat surface. This is the usual manner of carving in wood. Carving in the round, or carving in three dimensions, requires a block of sufficient size to encompass the limits of the model to be carved. Furthermore, this block should possess straight, even grain, and it must not crack or split. Such blocks are difficult to find. Then there is also considerable difficulty in holding such a block of wood in convenient positions for working all parts of it with equal facility. Such work in sculpture is better done in other mediums than wood. However, it sometimes happens that an ornament must be made in wood, and carved in the round to complete some scheme of decoration. Also, we find, even among amateurs, a desire soon develops to carve a complete figure visible from all sides.

Fig. 29, A, B, C, and D are examples of rough carved work from schools in Poland, India, and Switzerland

The oldest piece of wood carving in existence is the life-size statue of a man found in Egypt and dating, it is thought, to nearly 4000 B.C. This figure is carved in sycamore wood, and is one of the earliest works of art which even Egypt has preserved for us.

In our study of wood carving as it is now being executed in the schools of foreign countries, we find many fine examples of carving in the round.

In doing this style of carving, it is more necessary than ever that the student carry a clear visualization of his work constantly in his mind since these models do not repeat as do most motifs used in relief carving, but are constantly changing in shape and form. In order that this mental image may be present in the mind, it is necessary to work up a model from which to work. These models may be made in clay, plaster, or any easily worked material of similar nature. It is from these previously worked out models that the carver takes his measurements with calipers as he progresses with his work.

The pieces A, B, C, and D, Figure 29, have been selected to show work in process of construction, and work left with a sufficient degree of tool roughness in evidence to show the vigor of execution. B was made by Kalosasi Banerji, a student in the Government School of Art, Calcutta, India. Much work yet remains to be done on this piece. It shows,

however, careful blocking out of the figure. A was made by a student in the State School of Wood Industry, Zakopane, Poland. This piece is not carving in the round, but is included here as an excellent example of rough carving. C was made in the Academy of Arts, Warsaw. D was made by a student of wood carving in Brienz, Switzerland, and is a splendid example of craftsmanship.

At A, B, C, D, and E, in Figure 30, are shown some most

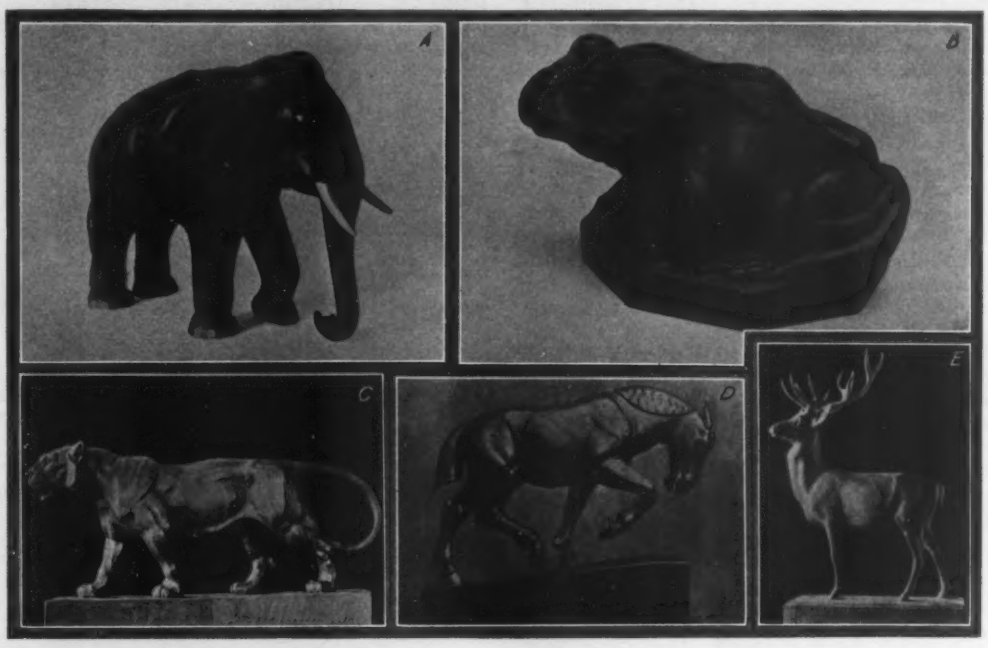

Fig. 30. A, B, C, D, and E are examples of animal carving in the schools of India, Holland, and Switzerland

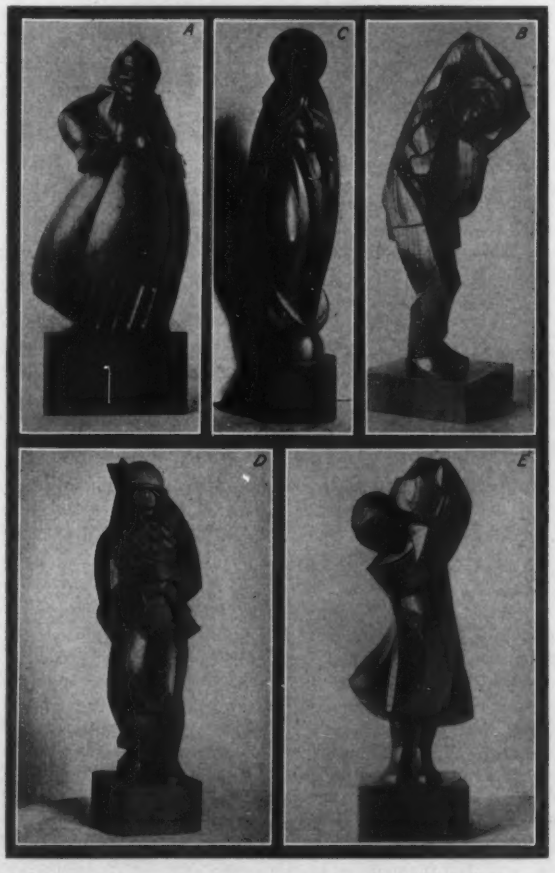

Fig. 31. A, B, C, D, and E are typical examples of modern semigeometric wood carving. Done in the school at Zakopane, Poland

Fig. 32. A student in wood carving in Berchtesgaden, Germany

excellent examples of wood sculpture work done from animal motifs. The elephant shown at A, is carved in teak wood, size 4 by 6 in. The tusks are painted ivory. It is the work of a student in the cabinetmaking and joinery class in the Government Woodworking Institute, Bareilly, India. The frog shown at B was made in the crafts school at Arnhem, Holland. This would afford a good model for practice carving in soap. A few bold lines are made to carry the eye of the onlooker from one part of the figure to another. The animal carvings shown at C, D, and E, were made by students in the *Schnitzlerschule* in Brenz, Switzerland. These last three pieces are most excellent representative models of wood carving. Note how the artist manages to show grace, strength, and movement in each of these pieces.

The statuettes shown at A, B, C, D, and E, in Figure 31, introduce modernistic examples made in the schools of Poland. It happens that all of the work shown here was made in the State School of the Wood Industry, in Zakopane. These are typical examples on modern semigeometric wood carving. This school has created a style of its own not found in the work of any other period, and, so far as the present author knows, is not duplicated in any of the other of the wood-carving schools of Europe. This work is done in what is known in Poland as black oak. This innovation is a revolt against old ideals, and seeks to introduce a symbolism based on the body in action in highly conventionalized conceptions. The work of this school has attracted much attention in art exhibits, and warrants our careful study.

Figure 32 shows a young carver at work on a figure in the school at Berchtesgaden, Germany. It will be noted that the figure is still attached to the block of wood of which it forms a part. These figures are often first sawn down to approximate shape on a band saw, thus eliminating much of the labor of roughing out. Those who have visited Oberammergau at the time of the Passion Play have seen many of these little figures which are made and sold by the villagers. A visit to these workshops is interesting to those who enjoy craftwork.

Figure 33 shows one student's conception of a faun. The originality and boldness of his lines, are not excelled by any piece shown in nearly fifteen hundred pictures collected of work in wood carving as done in the various foreign schools. The movement is dynamic, and the work is of a highly credible and original nature. This piece was made in the school at Villach, Austria.

These articles serve to illustrate the fact that while in America the wood carver had not produced anything distinctive and national, being content for the most part to copy the old masters, this is not true to the same extent in Europe. In the European schools there are considerable signs of feeling for new ideas in expression, and much of the work indicates impending fruition. Some work is being done in harmony with the modern spirit in decoration. In many of the carvings shown in this article, the reader will note economy of method, this is especially true of the semigeometric carving which is having some vogue in the schools of Germany, Austria, Czechoslovakia, and Holland.

Fig. 33. A faun made by a student in the school at Villach, Austria

Industrial Arts and the Girls

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A plea and a plan for giving much-needed instruction in industrial-arts work to girls as well as to boys who are attending the American junior and senior high schools.

IN A COUNTRY where demonstrations of science and industry such as the Chicago Century of Progress are seen, there can be little doubt of the importance of the industrial world.

It follows logically that with the ever-increasing mechanical developments (the U. S. Patent Office grants one thousand patents each week), many of our everyday problems of living will be influenced by science, industry, and the arts and crafts. Every essential factor in modern life implies the increasing exercise of skill and the application of science to the daily work of the world. Present developments show that the day will come when the boys and girls that are now in school must be able to adjust themselves quickly and intelligently to changes coming through industry. They therefore need training which will ground them in sound principles of science, give them an understanding and knowledge of equipment and materials of production, and a grasp of the principles of design. That these industrial-arts courses which should be fundamental in the giving of this training are still occasionally looked upon as "special" subjects or as educational "fads" is to be deplored. Perhaps a part of the criticism is due to the fact that many shop teachers are not well trained for their job. Too great an emphasis has been placed on mere handwork and the production of interesting objects, with little thought about the wealth of valuable related and scientific information that should be taught in close relationship with the manual processes.

Fortunately an increasing number of teachers are beginning

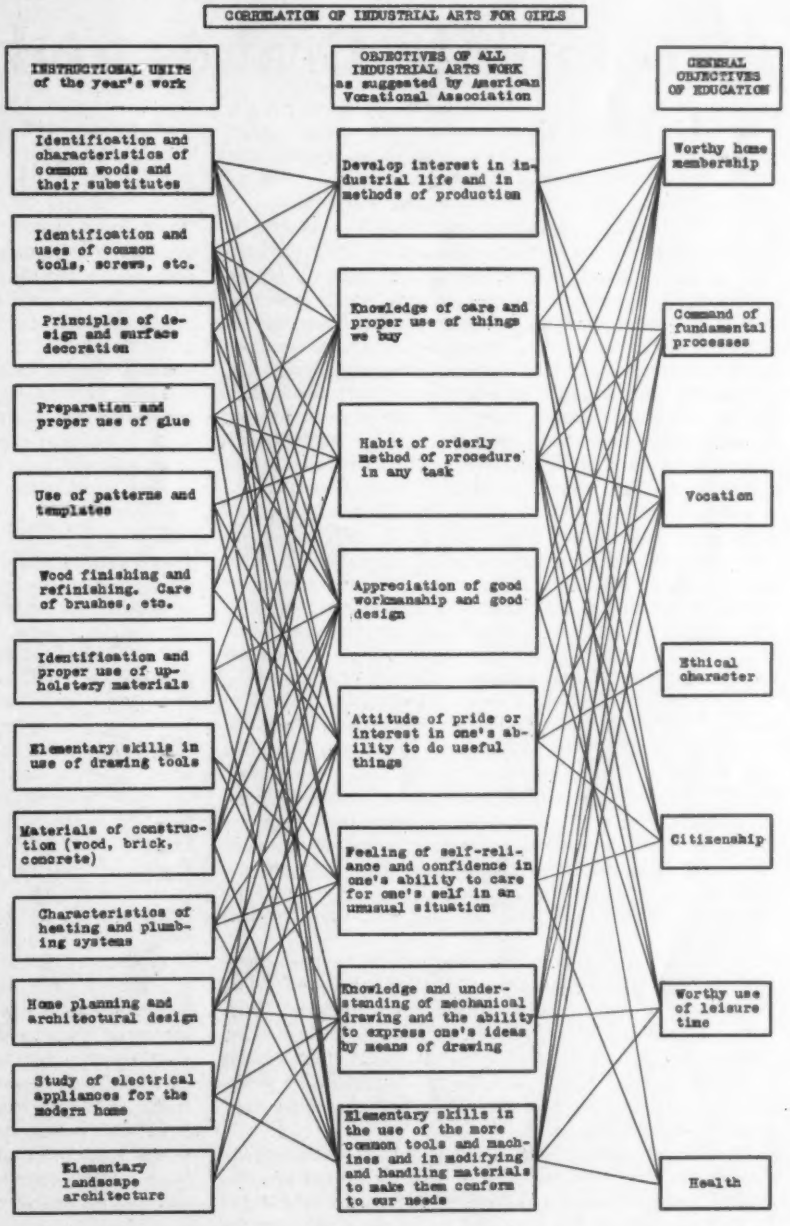
to realize that interests in material things are excellent centers around which education of lasting value can be achieved. In progressive schools throughout the country, "projects" are no longer used as side shows or special exhibits, but a succession of "projects" is displacing the old departmentalized curriculums. The practical-arts teachers have been pioneers in the use of projects, but too often they have neglected to organize and teach the related cultural and scientific information that can be taught so efficiently through the use of well-chosen projects which in themselves develop useful skills, habits of orderly procedure, intelligent consumption, and exploratory experiences into the industrial world, and the like.

If the industrial department is to do these things for the boys, why should we not include the girls? Surely girls need to be able to select wisely, care for, and use properly the things they buy. They should be able to appreciate good workmanship and good design even more than the men, since women do most of the buying for the home. In fact, there is not a single objective in the list set up by the committee of standards of the American Vocational Association two years ago which would not be as useful to a girl as to a boy. Of course, the projects used to gain these objectives should be developed to meet the specific needs of the girl just as they are for the boy, but the modern girl living in an industrial age should not be denied knowledge of the industrial arts.

The need of some sort of industrial-arts course for girls became evident by the number of questions about refinishing and identification of woods, electrical installations and equipment, room and stair planning, and the like. These came from women after a series of exhibits in local store windows where people who have lost contact with the school could see them. Most of these problems were semitechnical and came from average homes.

Superintendent F. G. MacLachlan offered his assistance in working out a suitable program for introducing such a course for girls and with the approval of the state department, the industrial-arts field was opened to the senior-high-school girls.

During the first semester, the girls learned many of the simple but useful processes in woodwork, wood finishing and upholstery through the making of a number of small projects and the fireside or radio bench shown in Figure 1. The fundamental processes were taught with as many facts about industry, design, material, and sound construction as seemed to be suggested by the work. Because the projects had value in themselves and were new, they aroused the creative interest in the pupil, and a desire to own a well-made project helped to keep up working standards. In fact, the school


CORRELATION OF INDUSTRIAL ARTS FOR GIRLS
INSTRUCTIONAL UNITS of the year's work
OBJECTIVES OF ALL INDUSTRIAL ARTS WORK as suggested by American Vocational Association
GENERAL OBJECTIVES OF EDUCATION
Identification and characteristics of common woods and their substitutes
Identification and uses of common tools, screws, etc.
Principles of design and surface decoration
Preparation and proper use of glue
Use of patterns and templates
Wood finishing and refinishing. Care of brushes, etc.
Identification and proper use of upholstery materials
Elementary skills in use of drawing tools
Materials of construction (wood, brick, concrete)
Characteristics of heating and plumbing systems
Home planning and architectural design
Study of electrical appliances for the modern home
Elementary landscape architecture
Develop interest in industrial life and in methods of production
Knowledge of care and proper use of things we buy
Habit of orderly method of procedure in any task
Appreciation of good workmanship and good design
Attitude of pride or interest in one's ability to do useful things
Feeling of self-reliance and confidence in one's ability to care for one's self in an unusual situation
Knowledge and understanding of mechanical drawing and the ability to express one's ideas by means of drawing
Elementary skills in the use of the more common tools and machines and in modifying and handling materials to make them conform to our needs
Worthy home membership
Command of fundamental processes
Vocation
Ethical character
Citizenship
Worthy use of leisure time
Health

interest became so great that over half of the lady teachers came for a Saturday-mornings class.

Of course, the students are always permitted to make changes in the design and surface decoration in order to develop selective ability, but the essential construction was standardized so that the material could be organized and taught efficiently.

In order to give the girls an insight into industry, some of the operations were demonstrated twice. Once as they were to do it, or sometimes as it has been done in the past, and once as the modern factory would do it. Many demonstrations were given of things too difficult for the students to do but which could be understood and appreciated. Samples of good and bad construction also were studied.

The last semester of work was called "general mechanical drawing." Because of a girl's interest in houses rather than in mechanics, most of the time was spent in a study of house arrangement, and the construction of mechanical and electrical equipment. After the preliminary work in drawing on the technique of using the tools was finished, each girl chose a magazine picture of a small home and began to study materials and construction so that she could plan this house as she would like to have it. Because the houses were all different and each girl was working on her own drawings, there was a great deal of interest shown in our semiweekly round-table talks where each feature of every house was discussed.

Figure 2 is a chart which was used to show some of the correlations between industrial-arts and the general objectives of the high schools. From this chart it is quite evident that industrial arts for girls can claim:

1. Natural interest of a large percentage of the students.
2. Practical values which are not covered in any other courses.
3. A positive contribution to the objectives of secondary education.

Automobile Brakes and Safety

A. H. Vance

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A good safe-driving lesson for the school auto shop.

CONTRARY to popular opinion, defective brakes do not appear to be the cause of many motoring accidents of a serious nature. This contradiction is apparently proved by Traveler's Insurance Company statistics which show that only 1.57 per cent of all reported accidents are due to defective brakes, although a mechanical examination made in 1933 of more than 3,000,000 cars proves conclusively that at least one third of all the cars in use have defective brakes.

However, the failure of these defective cars to live up to expectations and cause their share of accidents is not difficult to understand if we know both automobile brakes and the mental attitude of the average driver. Generally, the driver of a car with definitely bad brakes is painfully aware of this fact, and drives sensibly, well within the limits of his ability to stop. But the driver whose car supposedly has good brakes usually drives faster than he should, quite often overestimating his own mental ability to react to an emergency. Bad road conditions add immeasurably to the hazard, and sooner or later the overconfident driver figures in a serious accident — doubly serious because of the higher car speed.

These statistics on brake failures are definitely misleading, however, since all poor brakes are classed as defective, although in the language of automobile mechanics there is a vast difference between a "poor" brake and a "defective" brake. Poor brakes are those which merely require tightening in order to increase their stopping power, while defective brakes are those which possess some inherent defect, quite often irrepairable, although a safety-lane test might conceivably pass the car as satisfactory. And, if pessimistic mechanics are to be believed, practically all cars have some inherent braking defect.

As a matter of fact, built-in braking defects are much more common than is generally supposed. Perhaps the most serious of these is the general failure of all brakes to adjust themselves to road conditions, wherein they act to destroy wheel traction quickly on slippery pavements, quite often starting a disastrous skid. Under bad driving conditions, a brake which lacked stopping power might be a distinct advantage, even to good drivers.

The second serious fault to be found in braking equipment is the virtual impossibility of securing proper equalization of braking effort on each wheel. Often, the brakes can be well equalized in the shop, but slight changes in weather conditions, a change in the temperature of one brake drum, or a slight shift of axle location because of a worn spring bolt, may cause most of the braking effect to shift to any one of the four road wheels. Disaster often follows this shift, acting to throw the car into the ditch or in the pathway of another car.

Another quite common braking fault is the extreme difficulty of adjusting brakes so they will pull equally on each wheel over the entire range of brake-pedal travel. Thus, at high car speeds, since it is dangerous to attempt a quick stop, a partial depression of the pedal may act too quickly on one wheel, and throw the car into a skid with equally bad results.

It is quite possible that only a very few of the heavy-footed drivers who burn up the highways are aware of the existence of these inherent braking faults. Hence, any study of brakes must include a thorough analysis of the characteristics of the brakes, not only of each make of car, but of each individual car also. For, once a car has left the factory, it takes on a character all its own, and its driver should know these faults and make due allowance for them.

Two general types of brakes, mechanical and hydraulic, should be considered — air brakes are relatively scarce and hence have no place here. The word *mechanical* is used to designate those brakes which are actuated from the brake pedal by means of mechanical contrivances, rods, pins, arms, linkage, or cables. Hydraulic brakes, also, are reasonably well known, and use oil as the sole actuating medium. This oil flows through pipes to cylinders in each rear wheel, pressure being created for braking by the direct operation of the brake pedal on a master cylinder under the floor boards.

Mechanical brakes are sometimes complicated by the use of vacuum brake boosters, self-actuating brake bands, or by the application of power from the drive shaft directly to the brake control rods. Most of these devices can be ignored in a study of brakes, since the real purpose of a brake examination is to determine the braking ability and relative safety of the mechanism at various car speeds.

If brakes lack stopping ability, the linings on all four wheels should be examined for wear and new linings installed if the old ones are worn to one half their original thickness or less. If one band requires new lining, then all should be relined.

Drums should be examined for warping or for scoring, and trued if necessary. On some cars this inspection can be accomplished by the removal of inspection plates, but on most cars it will be found necessary to remove the wheels for a satisfactory examination.

While the wheels are off, the movements of the brake bands should be studied. This can be done by having an assistant operate the pedal, thus allowing others to watch the brake rod and linkage movements. Any failure of the rods to operate should be noted, and steps taken to correct the trouble. Brake cross shafts sometimes freeze from lack of lubrication or from other damage and must be removed and freed.

The relined bands must be fitted to the drum shape as accurately as possible so that a minimum of movement is necessary to bring the entire circumference of the band into contact with the drum. If brake shoes are used instead of bands, this fitting is often impossible because the material used cannot be bent, hence reinstalling is all that can be done.

After the wheels and drums have been replaced, the wheels should revolve freely and quietly. If high spots exist on the drum these will be indicated by a regularly recurring sound as the wheel is turned. Burning the brakes in slightly by starting the engine, and with the car in gear, depressing the brake pedal to the point where the brakes drag, sometimes acts to remove these high spots.

The angle of the brake arms should be the same on opposite wheels in order to equalize the brake-rod pull on each rear or front wheel. Adjustments are provided for this purpose on some cars. The angle of the arms of the brake cross shafts beneath the body of the car is also important for the same reason.

It is customary to adjust brakes to a point where a distinct drag is felt, then slacken the adjustment slightly until the wheel turns freely. This is done on each individual wheel, after which the brakes are felt by having an assistant hold the brake pedal at various points while each wheel in turn is "tested" by hand. With the pedal depressed about an inch and held in this position, a slight drag should be felt on each rear wheel, with somewhat less on each of the front wheels. With the pedal about halfway to the floor boards, it should be practically impossible to move the wheels any distance, while a further depression should lock the wheels against any movement by hand.

The drag must be equalized between the rear wheels, and also between each front wheel, with, in general, slightly greater braking effects noticeable on the rear wheels. A final test consists of driving the car and then applying the brakes quickly on a dry floor or pavement. Pulls to the right or left can be felt by the driver, or if the wheels lock, this will show as a mark on the floor. Slight further adjustments will usually compensate for any unequal locking tendencies.

A final check-up to see that all cotter pins are in place, and that all wearing points are properly lubricated, completes the shopwork. A road test, with a check-up on the braking ability up to forty miles an hour is advisable as a further safeguard. Side drags occurring at these higher speeds should be compensated, if possible, without destroying other necessary brake characteristics.

Hydraulic brakes are inspected and checked in a manner similar to that used on the mechanical types, except that the actuating mechanism must be considered and checked for leakage or for damage which might result in a broken oil line. Since these brakes are fully equalized as far as brake-band pressures are concerned, a break in any oil passage will destroy the braking action completely, and often quite suddenly. The same is true of a completely equalized mechanical system; the breaking of a rod or a pin will make the effective use of the brakes impossible.

Since the ability of brakes to stop a car depends not only on the brakes themselves, but also upon numerous other factors, such as "roadability" of the car, loading, or weather, with a host of others too numerous to mention, a test card as handed to the owner might well read: Brakes unsatisfactory at speeds above forty miles an hour. Band linings ineffective at any speed when wet. Complete brake equalization impossible, etc. And yet this car might pass a safety-lane test 100 per cent.

Accidents and Health Hazards

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THIS article is intended to present, in outline form for easy reading and study, the major accident and health hazards encountered by workers in the printing trades, the results of these hazards, and suggestions for their prevention.

It is hoped that these suggestions will be of value to the students of printing in acquiring safe practices in the handling of equipment and in acquiring healthful habits of living. The outline also may serve teachers of printing as a basis for a course of study in good health and safe habits to teach to their students.

The outline shown herewith has been worked out specifically for the students in school printshops. It will be followed by brief articles in which the subjects of accidents and health are more fully developed. It is hoped that this material will cause teachers of other shop subjects to study the accident and health hazards of their shopwork in a similar manner.

Accident Hazards

Hazard	*Result*	*Preventive*
Platen presses	Crushed hands or fingers	Install proper guards; do not try to feed very small or odd-shaped sheets; do not reach for falling sheets.
Cylinder and rotary presses	Crushed or cut hands or feet	Guard all hand and foot hazards; get aid when removing and placing rollers.
Saws and saw trimmers	Mangled hands, injuries to eyes	Use guards and work holders at all times.
Composing machines	Burns, mangled hands	See that all automatic stops work correctly; do not throw pigs of metal into pot; guard molds, gears, and belts.
Paper cutters	Loss of fingers or hand	Work alone when cutting paper; do not catch scrap as it comes from the knife; see that non-repeating devices work properly.
Slug cutters, mitering ma-	Crushed, torn, or cut fingers or	Take great care on unguarded machines; use

chines, etc.	hands	guards when prov.ded.
Littered floors	Tripping and falling	Keep floors free from wastepaper.
Oily floors	Tripping and falling	Do not allow machines to leak oil onto floor.
Sleeves, ties trousers, smocks	Getting caught and injured by gears, shafts, or other moving parts	Do not wear a long tie, loose, flapping sleeves or trousers, roll sleeves and trousers on inside.
Lifting forms	Rupture, strains	Get aid in lifting heavy forms.
Unguarded belts, shafts, gears	Being caught and injured	See that all belt and gear hazards are well guarded.
Staplers, stitchers, round-cornering machines	Crushed fingers or hands	Install guards where possible, take care in operating.
Oiling when machine is being operated	Hands smashed or cut	Do not wipe or oil machine while it is in operation.
Tripping and falling	Bruises, broken bones, in falling down or against machine	Keep all type cases closed, even when leaving them for a moment, especially the lower ones; roll trousers on the inside.
Folding machines	Getting caught in rollers, belts	See that machine is well guarded.
Fire	Burns	Use safety cans for benzine, gasoline and kerosene; do not keep stores of inflammable liquids in workroom; don't use celluloid eyeshade if you must smoke at work.
Handling paper	Paper cuts, rupture, strains	Take care of paper cuts to avoid infection; do not lift heavy paper loads.
Handling plates	Cuts on the hands	Take care in removing plates from patent base; treat wounds for infection.
Tools	Cuts, stab wounds, falls	Do not carry open spot-up knives in the pocket; do not leave tools on the floor.
Horseplay	Falling against other workmen who are operating machines; falling against or into machines	Refrain from wrestling or engaging in other play around machinery.
Talking with workmen operating machines	Getting out of time with machines and being injured	Do not talk to operators on machines.
Feeding of too difficult jobs on platens	Crushed hands or fingers	Run long, narrow jobs two or more up; do not reach through press to save a falling sheet.
Static electricity	Crushed hands or fingers	Do not attempt to feed electrically charged sheets by hand.
Using machines without instruction or permission	Various injuries	Keep shop discipline; put up danger signs.

Health Hazards

Hazard	*Result*	*Preventive*
Lead poisoning	Colic, constipation, paralysis, diseases of the heart, blood vessels and kidneys, insanity, death	Do not create lead dust by splashing pigs in the metal pot; keep type from mouth, avoid dry sweeping; do not eat in the workroom; wash hands before eating; clean nails often; do not smoke or chew while at work.
Improper ventilation	Fatigue, weakening of bodily resistance, poisoning from gas and fumes	Provide proper ventilation; keep pipe fumes and gases out of shop.
Carbon monoxide	Headache, dullness, lassitude, nervousness, insomnia, digestive ailments	Provide proper ventilation; keep pipe fumes and gases from gas-fired pots out of shop.
Tuberculosis	Sickness, death	Do not use common drinking cup or towel; prohibit spitting on the floor; exercise in open air and in sunlight; get good ventilation while at work.
Benzine	Skin infections, faintness, dizziness, headache, vomiting	Provide proper ventilation; use gloves if susceptible; provide adequate washing facilities.
Cleaning mixtures (anilin oil)	Convulsions, death	Provide proper ventilation, do not splash mixtures on hands or clothing; wear gloves.
Poor blood circulation	General ill health	Exercise in sunshine and open air after working hours.
Bad lighting	Impaired eyes	Provide proper light, correctly shaded.
Unclean wiping cloths	Skin infections	Use sterilized wiping cloths only.
Fatigue	Ill health	Proper rest.
Dust	Diseases of the respiratory system	Prohibit dry sweeping; clean plungers outside or in a box; do not blow out cases with bellows in the workroom.

Securing Shape Harmony

J. Woodard Auble

Arsenal Technical Schools,
Indianapolis, Indiana

An excellent related-subjects material lesson for the printshop.

> ". . . it is essential that the shape of the type page should harmonize with that of the paper." — I. T. U. Lessons in Printing, Unit III, Lesson 3.

THE teacher of printing, at some time during the apprenticeship of the student, is usually asked, "How does one tell how wide and how long to set the job?" The answer to this one question motivated the study which follows.

An accurate measurement of five hundred books, selected at random from the school library, was made to determine what had been and was being done with success in the planning of books. It was thought that the results obtained would give a standard from which one could plan other books.

The summary of the averages of the measurements taken, would result in a composite book which would have:

Width of page .....30.61 picas	Page proportion....1:1.48
Length of page ....43.32 picas	Type proportion....1:1.62
Width of type .....21.72 picas	Inside margin..... 3.63 picas
Length of type ....35.40 picas	Outside margin..... 5.10 picas
Proportion of page	Top margin ..... 3.50 picas
to type 1:0.47	Bottom margin..... 6.27 picas

The most valuable information obtained from this study was the proportion or per cent of type to page and the summary of the margins. There was not a great range in the proportion of type to page, not over 10 per cent either way from 50 per cent, in all of the books measured. This means that if one plans a book page such that half the area of the page will be filled with type, he will not be far from what has been done successfully in the past. The result of the margin study rather upsets the idea that one must have a 3:5:7:9, or thereabouts, ratio to have pleasing proportions. Very few books had margins similar to this. In fact, the top margin was slightly smaller than the inside margin.

This book study revealed one fault with present-day books. The type proportion did not in many cases follow the page proportion, that is, the "golden oblong" was being mixed with the "hypotenuse" or other rectangular shapes. This may have been caused by one of several factors: mechanical limitations, lack of the desire for the same proportions in each, or a lack of the knowledge or ability to have the two the same. The desirable book to be pleasing to the art authorities should have the same proportions in both the type page and the sheet. If the book page is 6 by 9, then the type ratio should be 2:3, or 1:1½.

In answering the previously stated question as to how wide and how long to set the job, one must have the dimensions of the paper which are either decided by the customer or the paper-supply house. The customer will say he wants a page of a certain size, or the folding of a stock sheet will give the limitations.

After the size of the sheet is determined, it is necessary to find its proportions so that the type page may be made the same. To find this proportion one divides the length by the width. Trimmed size is understood: 6 by 9 is 1:1.50; 8½ by 11 is 1:1.29; 5 by 8 is 1:1.60; 5½ by 8½ is 1:1.54; and 6 by 8½ is 1:1.42. The next step in planning the book is to determine the area of the type page. This type area should be half, or nearly half, the area of the page. Then, a 6 by 9 page whose area is 54 sq. in. should have approximately 27 sq. in. of type. Since the inch unit is so large that it will cause unnecessary fractions in the majority of cases, it is desirable to change all the measurements to picas and square picas in planning the job. Having found the number of square picas to be filled with type, it is necessary to find two dimensions which are the same proportion as the page and which when multiplied together will result in this number.

For illustration and clarity, take a page and plan it according to the preceding. Suppose the page size is 6 by 8½ in. Changed to picas this is 36 by 51, the proportion is 51 ÷ 36 or 1:1.42, and the area is 1,836 square picas. Half the sheet area is 918 square picas, which is to be the area of the type page.

The ratio 1:1.42 means that for each pica in width of the form the length will be 1.42 picas, or the length will be 1.42 times the width. If the width is 2, the length is 1.42 times 2; if 3, it is 1.42 times 3, or for any number it is 1.42 times that number. Suppose the width is W then the length is 1.42 times W or 1.42 W. In the example (6 by 8½) the type area was to be 918 square picas. W (which is the width) multiplied by 1.42 W (which is the length) should equal 918 square picas. Putting this into a statement and solving for W,

$$W \times 1.42W = 918 \text{ square picas}$$
$$1.42W^2 = 918$$
$$W^2 = \frac{918}{1.42} = 646$$
$$W = \sqrt{646} = 25.4, \text{ say, } 25.5 \text{ picas} = \text{the width}$$
$$1.42W = 1.42 \times 25.5 = 36.2, \text{ say, } 36 \text{ picas} = \text{the length}$$

Thus one has the dimensions of a type page (25.5 by 36) which has the exact proportion (1:1.42) or is of proportionally the same ratio as that found in the page 6 by 8½. Also, the area of this type page is 50 per cent of the area of the page.

Now, let us try another. The customer orders a booklet which will trim to 4¼ by 7¼. This in picas is 28½ by 43½ or 1,240 square picas. The proportion of the sheet is 43½ ÷ 28½ or 1:1.52.

Let W = the width
Then $1.52W$ = the length
And $W \times 1.52W = 620$ (half the sheet area)
$$1.52W^2 = 620$$
$$W^2 = \frac{620}{1.52} = 407.9$$
$$W = \sqrt{407.9} = 20.2, \text{ say } 20 \text{ picas.}$$
$$1.52W = 1.52 \times 20 = 30.4, \text{ say } 30 \text{ picas}$$

20×30 picas is the proportion 1:1.50, which is as near the same as the page as the printer's equipment will permit.

Magazines and folders will present a problem slightly different from books in the planning of the length and width of the type page, because they are planned usually with a greater economy of space. For example, *The Saturday Evening Post* type page is .8 or 80 per cent of the page. In planning a magazine page it is still desirable to have shape harmony.

The *Post* is 64.5×82.5 picas or 5,321 square picas and the ratio of length to width is $82.5 \div 64.5 = 1:1.28$. A page this size should have a type area of approximately 80 per cent of the sheet, or in this case $.8 \times 5{,}321$ or 4,256.8 square picas. In solving this for length and width we would say:

Let W = the width
Then $1.28W$ = the length
And $W \times 1.28W = 4256.8$ square picas
$$W^2 = \frac{4256.8}{1.28} = 3325.6 \text{ square picas}$$
$$W = \sqrt{3325.6} = 57.6, \text{ say } 57.5 \text{ picas}$$
$$1.28W = 1.28 \times 57\tfrac{1}{2} = 73.6, \text{ say } 73.5 \text{ picas}$$

Then to have the same proportion as the sheet 64.5 by 82.5, the type page should be 57.5 by 73.5 picas. (The *Post* type page actually measures 57 by 74.5, the difference being caused by the fact that a type-page rating of 1:1.34 instead of 1:1.28 was used.)

Smaller magazine pages have a smaller percentage of type to the page than the *Post*. The *American* magazine uses 71 per cent type, the *Inland Printer*, 68 per cent, and the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine, 60 per cent.

Suppose one were to plan a job using the size of the *Inland Printer* as the trim size. How wide and how long should one plan the type? The measurement 56 by 73 is in the proportion 1:1.3. Since magazines of this type have from 65 per cent to 75 per cent of the sheet in type, we would say on the average that 70 per cent would be proper. Trimmed-sheet area = 56 by 73 = 4,088 square picas. Then the type-page area = 70 per cent of 4,088 = 2,861.6 square picas.

Let W = the width
Then $1.3W$ = the length
And $W \times 1.3W = 2{,}861.6$ square picas
$$W^2 = \frac{2861.6}{1.3} = 2201 \text{ square picas}$$
$$W = \sqrt{2201} = 47 \text{ picas} = \text{width}$$
$$1.3W = 1.3 \times 47 = 61 \text{ picas} = \text{length}$$

Then, to be in the same proportion as the sheet 56 by 73 picas and be 70 per cent of the area, the type page should be 47 by 61 picas.

Let us now take a magazine the size of INDUSTRIAL ARTS

AND VOCATIONAL EDUCATION and plan it according to the formula. In this magazine the page is $55\frac{1}{2} \times 73\frac{1}{2}$ picas, or 4,079 square picas. The type-page area is 41×60 picas, or 2,460 square picas, which is 60 per cent of the page on which it is printed. The ratio of the page sizes is $73\frac{1}{2}$ by $55\frac{1}{2}$, or 1:1.32. The ratio of length to width of the type form varies from this proportion considerably, it being 60 by 41, or 1:1.46. To conform to the formula, the page of type should be 43 picas, as one would secure by the following:

Let W = the width of the type
$1.32W$ = the length
$W \times 1.32W = 2460$ square picas (60 per cent of the page area)
$1.32W^2 = 2460$ square picas
$W^2 = \frac{2460}{1.32} = 1863.63$
$W = \sqrt{1863.63} = 43.2$, say 43 picas = width
$1.32 \times 43 = 56.8$, say 57 picas = length

It is a poor problem which will not work backward as well as forward. In this respect, this problem is perfect. For example, starting with a definite type-form size, one desiring a proportionate page size will reverse the process. Suppose a book type page measures 24 by $30\frac{1}{2}$ picas. The ratio is 1:1.27 and the area is 732 square picas. The page area should be twice this or 1,464 square picas and the equation would be:

Let W = the width
And $1.27W$ = the length
$W \times 1.27W = 1464$ square picas
$1.27W^2 = 1464$ square picas
$W^2 = \frac{1464}{1.27} = 1152.8$
$W = \sqrt{1152.8} = 34$ picas
$1.27W = 1.27 \times 34 = 43.2$ or 43 picas

Thus if the type page was 24 by $30\frac{1}{2}$ the sheet should be 34 by 43 to be in the same proportion.

A magazine or folder will present a variation only in the start of the problem. One must remember that if 70 per cent of the page is type then 100 per cent must be the sheet. For example, if the type area is 5,640 square picas and is to be 70 per cent of the page one would have the following problem:

70% or .70 = 5,640 square picas
$100\% = \frac{100}{70} \times 5640 = 8057$ square picas

Another example of finding the sheet size if a definite type size is given may be had by determining the harmonizing size of the paper for the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION type page. The type page is 41 by 60 picas and the ratio width to length is 1:1.46. Plan this for a page so that the area of the type is 60 per cent of the sheet.

60% = 2,460 square picas (41 by 60)
$100\% = \frac{100}{60} \times 2460 = 4100$ square picas = the area of the sheet
Let W = width of the sheet
Then $1.46W$ = length of the sheet
$W \times 1.46W = 4{,}100$ square picas
$W^2 = \frac{4100}{1.46} = 2808.2$
$W = \sqrt{2808.2} = 53$ picas or 8 5/6 inches = width
$1.46 \times 53 = 77.4$ picas or 13 in. = length

That is, a page in same proportion as the type page would be 8 5/6 in. by 13 in.

By using the foregoing method of finding the length and width of the relative parts of a job, the "essential that the shape of the type page should harmonize with that of the paper" will be achieved.

Casting in the School Shop—IV

N. A McMillan

Elmira, New York

The fourth of a series of lessons on molding.

Project No. 4

Project: Molding a cored pattern — table lamp. Suggestive projects with cores, candlestick, napkin ring, pipe fittings, bushings, or any simple cored pattern.

Tools and Materials: Core plate, strike, wire, three-cornered file, core sand, core oil, core paste, and the same tools for molding that were used in previous jobs.

Procedure: Molding with a dry-sand core differs from job No. 2 in that the casting is lightened by making its center hollow, so that the metal along the entire contour is about 3/16 in. thick. By doing this, three important factors are achieved. These are: the outside shape is retained, the weight is reduced, and the cost is lowered. The shape is retained because thin metal will not shrink as much as the heavier metal. The weight is reduced because the extra weight does not add to the strength of the piece being cast. Costs are lowered because the casting is lighter, and castings are paid by the pound. Make the core first, then prepare the mold.

A. Making a core in two halves, using the lamp core box shown in Figure 22.

1. Mix the core sand.

2. Ram the core box and place a wire rod about ⅛ in. in diameter in the center for strengthening the core when dry. If rammed too hard, the sand will stick to the box and will be too tight to allow the gases to escape. If rammed too loose, the core will not stand up when handled, or while the metal is being poured. Only experience will teach when the ramming is just right. Strike off the surface with a straightedge.

3. Lay a flat piece of metal on top of the core box and turn over. Let the edge of the box act as a hinge and draw the box off, as shown in Figure 22.

4. Place the core in an oven just as soon as possible for baking. The core should not be allowed to stand in the air very long as it will become air-dried and crumble.

5. When the core is removed from the oven, vent and assemble the core as shown in Figure 23. Rub the two surfaces together to secure a good face contact. Use a small three-cornered file to cut a vent in each half, making sure the grooves match. Coat the flat surface of the core with a paste made of flour and water, press the two halves together, and then set aside until dry.

6. The core should next be repaired if necessary, with a mixture of graphite and water made into a thick paste. Apply this only on spots that are broken, allowing the paste to dry. Finish surfacing the core by mixing more water with the paste and a small amount of molasses with the graphite forming a thin paint. This gives a smooth surface and aids it to withstand the heat.

Other types of cores illustrated for further study.

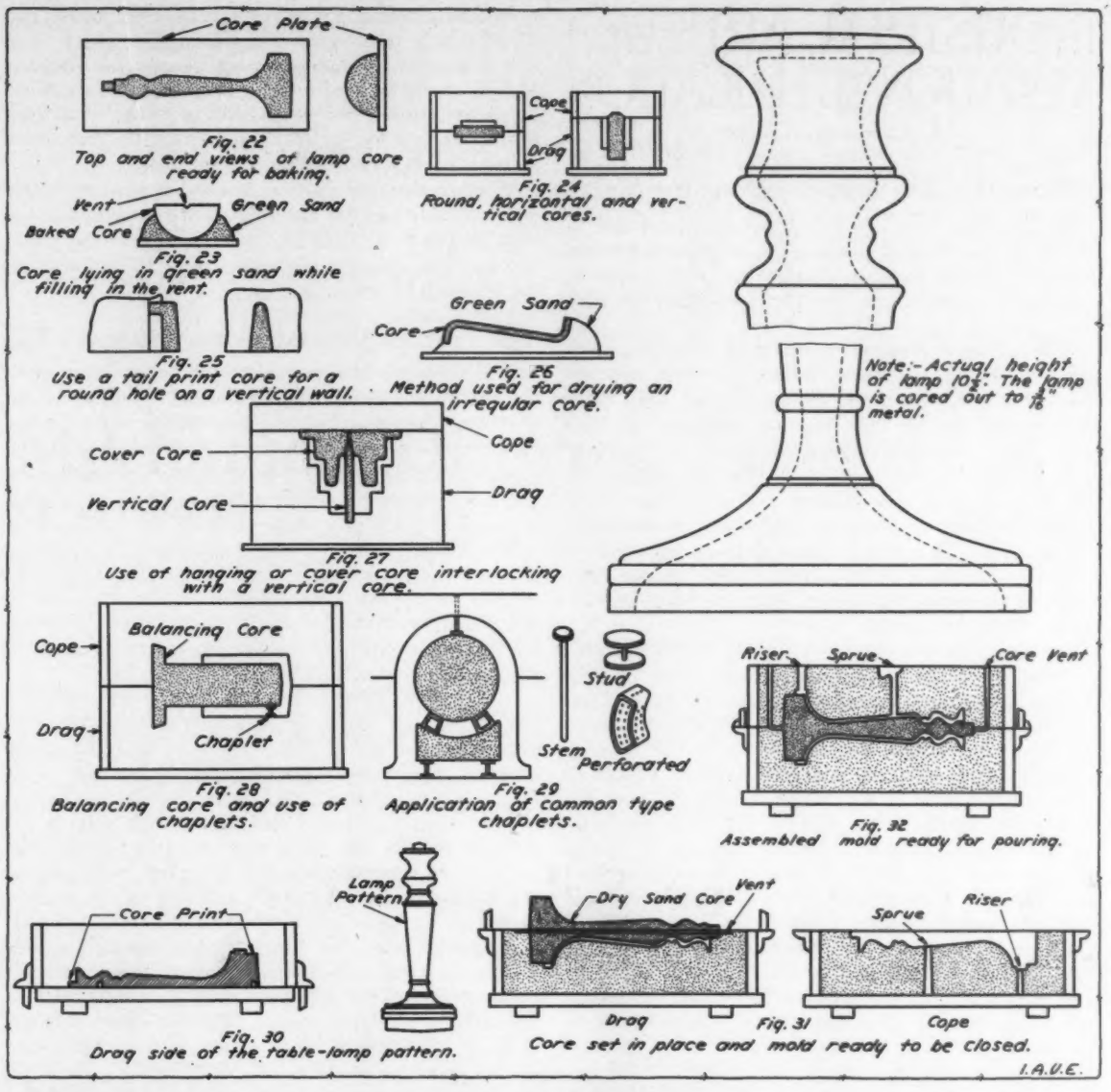
Figure 24. The *vertical core* is tapered on the cope end to allow the cope mold to be closed without damaging the mold. The round *horizontal core* is the most commonly used and the small sizes are made on a core machine, so that no core box is needed.

Figure 25. The *tail print core* is used in coring holes that appear on the side of a casting.

Figure 26. This method of supporting an irregular core by laying it in green sand while baking. Reference: *Foundry Work*, by Stimpson and Gray, page 84.

Figure 27. Illustrates a *cover core* which is used in the drag where possible, when the end of a casting is closed, as on a piston, or on a pulley.

Figure 28. *Balancing core*, used on cast-



ings where there is no opening or core print on the opposite end.

Figure 29. Illustrates the use of chaplets, for supporting cores the proper distance away from the mold, also to support a core as in Figure 28. Reference: *Foundry Practice*, by Palmer, pages 221, 222.

B. Preparing the mold for the table lamp. *Procedure:*

1. Ram up the drag in the regular way. The projections on the ends of the pattern are called core prints. These support the core in the mold. See Figure 30.

2. Roll over the drag and prepare the joint.

3. Place the cope half in position. Set the sprue and shrinkhead as shown in Figure 30. A riser shrinkhead is placed at the high point of the cope to hold the shape of the pattern, otherwise the liquid shrinkage would damage the casting.

4. Ram the cope as before, being careful not to ram too hard over the pattern.

5. Place the bottom board on, and draw off the cope. Roll the cope over as shown in Figure 31.

Time to renew your membership in the American Red Cross

6. Draw the drag and cope patterns. Slick the mold and graphite the surface.

7. Cut the gates. Three of them are necessary in order to distribute the hot metal quickly. This is necessary, because the metal may freeze or solidify, as the casting is to be so very light.

8. Set the core as shown in Figure 31. Make sure the vent is in the center of the core so it will match with the vent in the mold.

9. Close the mold as shown in Figure 32, and pour.

Question Sheet

Molding a Cored Pattern

Directions: This is a true-false test. Make a circle around the capital T if you think the statement is true, or make a circle around the capital F if you think the statement is false.

1. Three important factors are gained by coring out this type pattern, viz:

T F A. Reduce the cost by making the casting lighter.

(Continued on page 301)

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION
J. J. Metz, Editor

What Has The Summer Done for Me?

With vacation over, teachers may find it profitable to summarize the physical, professional, or cultural benefits they have derived from the past summer with a view of planning, if possible, an even better vacation for next year.

Some will have pleasant memories of delightful hours spent in boating, swimming, fishing, traveling, and the like. Others, with an eye to the future, may have spent six to twelve weeks of their vacation time in school. Still others have spent their time gaining practical experience in some phase of the work which they are teaching at school, or they may have spent their time at some calling entirely unrelated to the subject which they are teaching.

It would be difficult, if not impossible, to say which of the different ways of spending a vacation is the best way. There are too many variables entering into the considerations to make any general statement.

Of course, if personal feelings alone were consulted, traveling, camping, and fishing might receive the preponderance of votes. Factors other than personal inclinations, however, usually must be considered in the planning of a vacation.

For the man interested in his profession, attendance at summer school may appear, and really be, the most advisable. Yet, worthy as the decision to extend one's education may seem, considerations of personal or family health may make it not only advisable but even imperative at times to forego the benefits which accompany summer-school attendance. The decision not to attend a summer session at some good teacher-training institution should not be lightly made, however. The entire teaching profession is in a process of upgrading. There was a time when a bachelor's degree was all that was necessary to obtain a coveted principalship, but at present a master's degree is demanded by some school systems of the applicant for a teaching position in a high school. No shop teacher should overlook this fact. In order to advance, it is necessary to improve professional as well as teaching skill. Unfortunately, some very efficient shop teachers have overlooked this in the past, and, because of this, have failed to make the advances to which their classroom work has really entitled them.

Then, there are those who may have obtained enviable school records and degrees, but may still find it advantageous to spend their vacations obtaining practical experience in the subject or subjects which they are teaching or supervising. The teacher who has received most of his shop experiences in a teacher-training institution can gain much by getting first-hand experiences in industry. These industrial contacts may not increase the skills which the teacher has already acquired, but they will give him an insight into the evaluation and relative importance of the skills when applied to the various jobs by the artisan plying his trade.

At times there may be very good reasons for deciding to take a summer off and spend it just resting up. This is especially necessary if one is in poor health, or has had a particularly trying year. The main reason why a vacation is granted is to afford an opportunity for recuperation. It should be used for that purpose, too. Even when a teacher attends summer school, or works at a trade during his vacation, he should not forget the real reason for which this period of leisure is intended.

Whether, then, the vacation just ending has been wisely and profitably spent or not, it is not too early now to decide what is to be done next year, so that if this year's vacation was not all it might have been, the one planned for 1936 will be better.

The Teacher Viewed by the Student's Eye

"I'd like to see *him* do that job any better." How often has that remark been made by students whose work has just been adversely criticized by the teacher. All too often, there is little in the school shop to show just how skillful the instructor really is. It is true, he gives demonstrations, but these usually cover only a fragmentary part of what he wants to teach as a whole.

The student, therefore, may have reasons for doubting the teacher's proficiency as a craftsman, and this doubt reduces the efficiency of instruction in the proportion to which it is general among the pupils. It is well, therefore, for the instructor to demonstrate, from time to time, his ability of doing a first-class, workmanlike job.

This may well be done by personally making every project required in the regular course or by making and displaying specially pleasing pieces, in order to induce students themselves to attempt them or at least to set standards toward which the better students can aspire.

Some instructors find it very helpful, not only to display finished projects which they themselves have made, but to show separate pieces indicating how every part of the finished project was made. Displays of this kind in the classroom are valuable. They remind the student, silently yet potently, that a completed project is composed of separate parts, each of which must be carefully and accurately made. They also show that the pieces must be assembled in a definite way and that the final result can be good only if the finish is applied with the same care as that expended in the making of the parts.

Instructors who have used this method have also found that it helps their boys do better work because definite standards are presented to them, not in words, but in a concrete way that not only is easily understood, but actually invites imitation.

If this method of displaying samples of work is used, however, the instructor should remember that a definite plan for rotating the work exhibited must be provided. Anything displayed too long will lose its attraction for the student. Furthermore, the work must be kept clean. Exhibits covered with dust have little attraction. This detail, however, can easily be made part of the daily clean-up routine, and need not be looked upon as troublesome.

The many advantages accruing from the display of teacher-made projects are worth the extra work which they entail. Probably the greatest of these advantages, however, is the fact that the teacher demonstrates his knowledge and skill to the doubting, questioning minds of boys who are approaching the adolescent age, and thereby reduces to a minimum their oft-voiced objection to criticism, "I bet he couldn't do it any better himself."

(Continued from page 299)

T F B. Keep the shape of the casting more nearly perfect.

T F C. Simplifies the molding process.

T F 2. The core is made in two halves, so that it may be dried out on a flat surface, and only one-half core box needs to be made.

T F 3. It is necessary to mix a core binder with core sand so that the sand may not break so easily.

T F 4. Wires placed in the core sand insure the core against breaking.

5. Two reasons why core sand should not be rammed too hard are:

T F A. To prevent the sand from sticking to the core box.

T F B. The core will not be porous enough to allow the gases to pass.

Multiple Choice

Directions: This is a multiple-choice test. Underline the correct response (or responses) to each statement.

6. If the core is allowed to stand very long before baking, it will (1) absorb moisture, (2) dry out and break, (3) become sticky.

7. It is necessary to vent a core before pasting together, because: (1) it is more convenient, (2) the core cannot be drilled, (3) it allows the gases to pass.

8. In order for a core to withstand heat, it is necessary (1) to apply graphite, (2) varnish, (3) water.

9. The purpose of a core print is to (1) allow the gases to escape from the core, (2) hold or support a core, (3) make room to draw the pattern.

10. Three gates are placed on this job to insure (1) the metal from freezing, (2) a more perfect castng, (3) clean metal.

11. The shrinkhead takes care of (1) liquid shrinkage, (2) solid shrinkage, (3) the overflow metal.

Instructor's Remarks:

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Mechanical Drawing Tests

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Similar drawing tests for grades 7B and and 7A appeared on page 165 of the April, 1935, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

Test for Grade 8B

Directions to Pupil

This is a multiple-choice test. There are five statements to each problem. Read each statement thoughtfully, then draw a circle around the letter which appears before the answer that you think is the correct one.

Sample: The draftsman's triangle is used to draw

a. arrowheads
b. circles
(c.) vertical lines
d. arcs
e. irregular curves

1. "Finish" when applied to machine-shop work means
   a. to polish the object
   b. to drill the object
   c. to file the object
   d. to bore the object
   e. to get the job done
2. The "finish" mark is placed
   a. anywhere on the view
   b. in spaces representing surfaces
   c. on lines representing surfaces
   d. inside of circles
   e. on center lines
3. A hole of ⅛-in. diameter is
   a. cored
   b. chiseled
   c. bored
   d. filed
   e. drilled
4. To "tap" a hole means to
   a. strike its edge lightly with a hammer
   b. strike its edge lightly with a mallet
   c. cut threads into its side
   d. bore another hole to meet it
   e. allow oil to run through it
5. The end view of a tapped hole shows
   a. two circles
   b. three circles
   c. one circle
   d. five circles
   e. no circles
6. To "ream" a hole means to
   a. cut threads into its sides
   b. chisel it
   c. to perforate it
   d. to make it smooth and shiny
   e. finish it very accurately
7. The end of a hole drilled part way into a piece is
   a. straight across
   b. square
   c. rectangular
   d. pointed
   e. semicircular
8. To knurl a piece means
   a. to roughen or indent a turned surface
   b. revolve it
   c. to polish it
   d. finish it
   e. to cut threads on it
9. The side view of a tapped hole can be shown by
   a. four dotted straight lines
   b. two dotted straight lines
   c. five full lines
   d. two full lines
   e. one dotted circle
10. F.A.O. appearing on a blueprint stands for
    a. the draftsman's initials
    b. the blueprinter's initials
    c. fit and oil
    d. finish all over
    e. file an oval
11. R.H. — U.S.S. means
    a. royal highness — United States Ship
    b. right height — under same side
    c. right-hand — United States standard threads
    d. ream hard — United States standard weights
12. When using a French curve the line drawn against it should pass through at least
    a. five points
    b. eight points
    c. three points
    d. one point
    e. two points
13. A hexagon has
    a. eight sides
    b. six sides
    c. two sides
    d. three sides
    e. five sides
14. A folding line on a sheet-metal pattern drawing is shown by
    a. solid straight lines
    b. black full lines
    c. dot-and-dash lines
    d. light dash lines
    e. vertical lines
15. In making the pattern drawing for a truncated cylinder the draftsman would use
    a. a French curve
    b. a thread gauge
    c. a file
    d. a tack lifter
    e. a pair of calipers
16. To draw a vertical line use a
    a. T square
    b. triangle
    c. pair of calipers
    d. T square and triangle
    e. scale

17. The sum of the degrees in the 30 — 60° triangle is equal to
    a. 360°
    b. 90°
    c. 220°
    d. 45°
    (e.) 180°
18. A scale is used
    a. to rule lines
    b. as a straightedge
    (c.) to measure with
    d. to clean scales off fish
    e. to sketch with
19. Every circle on any working drawing must show
    a. three center lines
    b. one center line
    c. no center lines
    (d.) two center lines
    e. six center lines
20. The front view of a cylinder appears as a
    (a.) rectangle
    b. circle
    c. triangle
    d. semicircle
    e. an ellipse
21. The front view of a working drawing usually shows
    a. the length and width of an object
    b. the diameter of an object
    (c.) the height and length of an object
    d. the length only
    e. the width only
22. Sheet-metal pattern drawings are used by
    a. the carpenter
    b. the cabinetmaker
    c. the machine-shop worker
    (d.) the sheet-metal worker
    e. the printer
23. All the lines on a rectangular prism are
    a. curved
    b. dotted
    (c.) straight
    d. oblique
    e. vertical
24. One view of an object shows
    a. five over-all dimensions
    b. one over-all dimension
    c. three over-all dimensions
    d. no over-all dimensions
    (e.) two over-all dimensions
25. Circles are located by their
    a. depth
    b. circles
    c. centers
    d. circumferences
    (e.) diameters

Test for Grade 8A

Directions to Pupil

This is a multiple-choice test. There are five statements to each problem. Read each statement thoughtfully, then draw a circle around the letter which appears before the answer that you think is the correct one.

Sample: The draftsman's triangle is used to draw
    a. arrowheads
    b. circles
    (c.) vertical lines
    d. arcs
    e. irregular curves

1. When measuring the outside diameter of an object the instrument used is a
    a. scale
    b. pair of dividers
    c. calipers
    d. French curve
    e. bow compasses
2. Crosshatching is used
    a. on top views only
    b. on side views only
    c. on front views only
    d. in revolved section views only
    e. in section views only
3. For measuring the inside diameter of a gas pipe the instrument used is
    a. a pair of dividers
    b. a bow pencil
    c. a pair of compasses
    d. calipers
    e. a screw-thread gauge
4. Crosshatching lines are generally spaced about
    a. 1/8 in. apart
    b. 3/16 in. apart
    c. 1/4 in. apart
    d. 1/32 in. apart
    e. 1/16 in. apart
5. A fillet is a
    a. rounded outside corner
    b. bevel
    c. chamfer
    d. joint
    e. rounded inside corner
6. Dimension numbers in fractions should be
    a. 1/16 in. high
    b. 1/4 in. high
    c. 3/16 in. high
    d. 1/8 in. high
    e. 1/2 in. high
7. Center lines should extend beyond the views about
    a. 3/4 in.
    b. 1 in.
    c. 2 in.
    d. not at all
    e. ½ in.
8. A half-section view shows
    a. half of the object
    b. a view with half of it in section
    c. a quarter of the object in section
    d. a half of a view with half in section
    e. half of a part of the object
9. A protractor is
    a. a pair of compasses
    b. an extension piece
    c. a measuring instrument for straight lines
    d. a scale for measuring angles
    e. a ruler
10. A 90° angle is
    a. an acute angle
    b. an obtuse angle
    c. a round angle
    d. a right angle
    e. a straight angle
11. One worker mentioned below is the only one who does not use mechanical drawings in his work:
    a. carpenter
    b. bricklayer
    c. machinist
    d. preacher
    e. electrician
12. One man mentioned below receives the highest wages:
    a. blueprinter
    b. tracer
    c. designer
    d. file clerk
    e. detailer
13. A note on a drawing relating to a three-way switch concerns the
    a. machine-shop worker
    b. sheet-metal worker
    c. car conductor
    d. traffic policeman
    e. electrician
14. Most working drawings have
    a. one view
    b. four views
    c. three views
    d. two views
    e. five views
15. On a doorbell wiring diagram a battery is shown by
    a. two small circles
    b. two small circles in a square
    c. a series of short and long parallel lines
    d. a series of parallel arcs
    e. one square inside of another square
16. A push button is represented by a symbol which shows
    a. one square inside a larger square
    b. one square only
    c. two ovals
    d. two circles of the same diameter
    e. a small circle inside of a larger one
17. The symbol for a doorbell is
    a. a circle over a rectangle
    b. a circle over a triangle
    c. like the symbol for a dining-room buzzer
    d. like a switch-box symbol
    e. like a battery symbol
18. The conventional symbol for cast iron is a
    a. series of dark vertical lines
    b. series of horizontal dark lines
    c. series of oblique dark lines
    d. series of oblique light lines
    e. series of oblique dotted lines
19. The conventional symbol for the end grain of wood is drawn
    a. free-hand
    b. with the compasses
    c. with the irregular curve
    d. with the bow dividers
    e. with the 45° triangle

20. The architectural symbol for the single-swing door consists of
    a. one oblique line and an arc
    b. two oblique lines with two arcs
    c. two horizontal lines
    d. one dotted and one full line and arc
    e. two full lines and an arc
21. The symbol for a casement window is drawn
    a. exactly like the double-hung window
    b. like a single-swing door
    c. like a double sliding door
    d. like two single-swing doors
    e. like a single sash window
22. Scale 3″ = 1 foot means that the object is drawn
    a. three times the natural size
    b. one third the natural size
    c. full size
    d. one-quarter size
    e. half size
23. A floor plan shows
    a. the edge view of a room
    b. the front view of a house
    c. the back view of a house
    d. the top view of a house or room under the roof or ceiling
    e. the top view of the floor or walking space only
24. Front elevation means
    a. that the front of the object is raised
    b. that an elevator is in the front of the building
    c. that the front of the house is raised
    d. that the front of the house is built
    e. that the front view of the house is drawn
25. The conventional symbol for a brick wall is crosshatched like
    a. cast steel
    b. brass
    c. cast iron
    d. wrought iron
    e. wood

Test for Grade 9B

Directions to Pupil

This is a multiple-choice test. There are five statements to each problem. Read each statement thoughtfully, then draw a circle around the letter which appears before the answer that you think is the correct one.

Sample: The draftsman's triangle is used to draw
    a. arrowheads
    b. circles
    (c.) vertical lines
    d. arcs
    e. irregular curves

1. The chamfer on a U. S. standard hexagonal bolt slants at
    a. 60°
    b. 30°
    c. 90°
    d. 45°
    e. 50°
2. When "pitch" is mentioned on a blueprint it refers to
    a. baseball
    b. asphalt streets
    c. music
    d. screw threads
    e. printing
3. The distance between the flat sides of a U. S. standard hexagonal bolt is equal to
    a. 1¼ times diameter of bolt plus 1/16 in.
    b. 3 times length of one side
    c. the distance between the corners
    d. 1½ times radius of bolt plus ⅛ in.
    e. 1½ times diameter of bolt plus ⅛ in.
4. The United States standard screw threads look something like the
    a. acme
    b. square
    c. vee
    d. Whitworth
    e. Buttress
5. The end of a U. S. standard bolt is
    a. a sharp point
    b. straight across
    c. rounded outward
    d. notched
    e. concave
6. The section line is a line consisting of
    a. two dots and a dash
    b. one dot and a dash
    c. three dots and a dash
    d. two dots and two dashes
    e. all dots
7. An auxiliary view is
    a. always a front view
    b. a helping view
    c. a useless view
    d. a section view
    e. a broken view
8. The top of a cone is
    a. rounded
    b. concave
    c. convex
    d. square
    e. pointed
9. The body of a scoop before it is formed is
    a. perfectly square
    b. rectangular
    c. irregular
    d. triangular
    e. even on all sides
10. Scale ½″ = 1′-0″ means that the object is drawn to a size of
    a. one half the whole
    b. one quarter the whole
    c. one third the whole
    d. one eighth the whole
    e. one twenty-fourth the whole
11. Wall outlet symbols concern the
    a. plumber
    b. carpenter
    c. baker
    d. electrician
    e. tracer
12. An irregular curve is an instrument often used in the
    a. wood shop
    b. machine shop
    c. sheet-metal shop
    d. printshop
    e. electrical shop
13. A graph is a device for showing
    a. the kind of screw threads
    b. progress of a subject
    c. the accuracy of a measurement
    d. the temperature of water
    e. the weight of iron
14. A truncated cone is one
    a. that has screw threads on it
    b. that is filed
    c. that is bored
    d. that has its top cut off
    e. that has a slot in its base
15. The pattern development of a truncated cylinder is
    a. square
    b. hollow
    c. irregular
    d. rectangular
    e. parallel
16. Center lines are inked after
    a. border lines
    b. extension lines
    c. object lines
    d. dotted lines
    e. crosshatching lines
17. The end view of a tapped hole appears as a
    a. square
    b. rectangle
    c. oval
    d. ellipse
    e. circle
18. An isometric drawing is a
    a. picture drawing
    b. two-view drawing
    c. sketch of three views
    d. three-view working drawing
    e. an oil painting
19. A semicircle is equal to
    a. 90°
    b. 30°
    c. 180°
    d. 360°
    e. 45°
20. In the drawing of the moldings we draw conventional breaks in the following number
    a. five
    b. three
    c. four
    d. six
    e. two
21. The slanting top of a truncated cylinder looks like a

a. square
b. cube
c. ellipse
d. triangle
e. hexagon

22. The draftsman can save time by making use of
a. Old English letters
b. compasses for irregular curves
c. conventional breaks
d. any order for inking
e. the triangle for all kinds of lines

23. An auxiliary view helps the workman to
a. understand the construction of the object
b. measure better
c. ink more successfully
d. get a higher salary
e. finish the front view

24. Center lines are made to
a. show the centers of holes only
b. show the centers of circles only
c. locate the center of any detail on the view
d. tell the workman where the center of the paper is
e. tell the workman how to turn the piece

25. A sheet-metal template shows the object as it would look
a. when flattened out
b. before it is formed
c. when painted
d. when finished
e. when tempered

Test for Grade 9A

Directions to Pupil

This is a multiple-choice test. There are five statements to each problem. Read each statement thoughtfully, then draw a circle around the letter which appears before the answer that you think is the correct one.

Sample: The draftsman's triangle is used to draw
a. arrowheads
b. circles
(c.) vertical lines
d. arcs
e. irregular curves

1. The best pencil lead for sketching is the
a. No. 6
b. No. 2
c. No. 3
d. No. 4
e. No. 5

2. In drawing screw threads they are shown
a. exactly as they appear
b. by a symbol
c. by a note
d. by a picture view
e. by an isometric drawing

3. When the scale of a drawing is smaller than the actual size of the object the dimension numbers are given
a. as half size
b. as quarter size
c. as $3'' = 1'$
d. as full size
e. as $6'' = 1'$

4. An assembly drawing is a drawing showing
a. many objects on one paper
b. the parts of an object in their natural relation to each other
c. sixteen or more views
d. a gathering of people
e. the pictures of different objects

5. In the symbol used for U. S. standard screw threads they are shown by
a. dash lines
b. invisible extension lines
c. one long and one short line
d. a series of long and short lines
e. dark curved lines

6. A bill of material is a
a. list of materials used and number needed
b. paper giving the cost of the objects
c. bill of things to be filed
d. list of things to be bought and sold
e. list of parts to be sold

7. One of the chemicals used in the manufacture of blueprint paper is
a. bicarbonate of sodium
b. potassium ferricyanide
c. nitric acid
d. epsom salts
e. analine

8. The color of fresh blueprint paper is
a. bluish green
b. greenish yellow
c. bronze
d. copper colored
e. dark blue

9. A "break" in a view is used
a. to make the drawing look better
b. to shorten the space required for a view
c. to show how the object can be broken
d. to explain what the crosshatching means
e. to show the shape of the object

10. When viewing the edge of an irregular or French curve it appears as
a. a rectangle
b. a square
c. one straight line
d. a curved line
e. a circle

11. The small diameter on a threaded part is called the
a. root
b. radius
c. fillet
d. crest
e. reamer

12. The United States standard hexagonal head bolts are
a. all the same size
b. of the same proportions
c. the same only in reference to the heads
d. threaded 1 in. down from the head only
e. exactly like the square-head bolts

13. When the object is drawn to one fourth of its natural size the scale may be given as
a. $12'' = 1' - 0''$
b. $4'' = 48°$
c. $6'' = 1' - 0''$
d. $3'' = 1' - 0''$
e. $4'' = 1' - 0''$

14. The sum of the largest angle in the 60° triangle and the smallest angle in the 45° triangle equals
a. 360°
b. 90°
c. 120°
d. 135°
e. 150°

15. A blueprint is a blue and white photograph produced on paper previously treated with
a. very black ink
b. blue and white ink
c. blue water color
d. coal-tar solution
e. chemical solutions

16. Tracing paper is an unsized, smooth white paper rendered transparent by an oily
a. stain
b. varnish
c. paint
d. lacquer
e. glue

17. In the manufacture of electric-printing blueprint paper, one of the following substances is not used:
a. tartaric acid
b. ferric chloride
c. potassium ferricyanide
d. carbon disulphide
e. distilled water

18. In importance one of the following occupations in the drafting profession is listed out of order:
a. chief draftsman
b. designer
c. blueprinter
d. trader
e. checker

19. One of the terms used below does not refer to screw threads:
a. crest
b. pitch
c. root
d. helix
e. finish

20. When the screw is turned clockwise the threads are said to be
a. left-hand
b. back-hand
c. right-hand
d. reversed
e. irregular

21. An orthographic drawing is similar to
a. an isometric drawing
b. a cabinet drawing

c. a cavilier drawing
d. a working drawing
e. a picture drawing

22. In the working drawing of one object the number of half-section views may be only
a. one
b. two
c. three
d. four
e. five

23. The thickness of the U. S. standard square nut is always equal to
a. the width of the head of the bolt
b. the diameter of the bolt
c. the thickness of the bolt head
d. the distance between the flats
e. the diagonal

24. Tracing cloth
a. shrinks
b. runs
c. bleaches
d. fades
e. stretches

25. A plan view is the
a. front one
b. end one
c. top one
d. side one
e. simple one

Problems and Projects

CHAIR LAMP

Lyle M. Garnett, Vocational School, Milwaukee, Wisconsin

(See Supplement No. 318)

A well-designed and well-made floor lamp is always a source of pride to the student. The one shown herewith embodies almost every type of turning taught. It includes plain spindle turning, faceplate turning, screw-chuck turning, mandrel turning, and spiral turning.

The column for the lamp is made of two pieces of 1-in. stock glued together. A 3/16 by 3/8-in. groove is cut into each piece before they are glued together. This groove is for the wire. When the glue on these two pieces is dry, glue on the blocks which are to form the large ball at the lower end of the column. These blocks should be glued far enough from the end of the stock so as to permit the turning of the tenon which is to fit into the base of the lamp.

Turn the column of the lamp according to the dimensions given on the supplement. The student will have less trouble with the turning of the column if he will start by turning the ball at the lower end first, then turning the plain cylinder for the spiral.

To lay out the spiral for the column, lay out the pitch of the spiral first. In this case the pitch is 2 in. Draw lines around the column at each of these places. Now divide each of these divisions into four parts and draw lines around the column again. Divide the circumference of the column into four parts and draw a line through each of these four points, for the full length of the spiral.

Cut a strip of heavy wrapping paper 1/8 in. wide and wrap it around the column forming the spiral. Be sure to have the paper cross the intersecting lines layed out on the column. Draw a pencil line on each side of the strip of paper. Start the second spiral halfway around the column from the point where the first one was started, and lay it out in the same manner.

To cut the spiral, make a saw cut along the center line of the larger spaces on the column. This may be done with a backsaw or a coping saw. You will find that once the saw is properly started it will follow the spiral. This cut should be made approximately 3/16 in. deep but should be of a fairly uniform depth the entire length of the column. The actual carving of the spiral can be done best with a butt chisel about 3/4 in. wide with the bevel turned downward. Work the chisel in a sweeping motion from both sides of the spiral toward the center. The saw cut will act as a sort of depth gauge. The finishing of the spiral is done with a rasp and sandpaper, while only the roughing cuts are made with the chisel. It will be found that the chisel will answer better for this job than would the gouge.

The bowl and its cap are easily turned on the screw chuck or screw plate, while the base is best turned on the larger faceplate.

Chair Lamp

The various short pieces with holes bored through them are best turned by boring the holes through before the turning is done, and then making wooden mandrels to fit snugly into these holes. This method will center the holes perfectly, which might not be the case if the holes were bored after the turning is done.

The four small feet are next sawed out, sanded, and screwed to the base, being sure to space them evenly around the edge of the base.

INSTEP TABLE

D. A. Price, Chicago Heights, Illinois

(See Supplement No. 319)

The instep table described in this article, like the hutch table which appeared as Supplement 308 in the April issue of this magazine, is an adaptation of one made early in the eighteenth century. This table may be made of maple or of pine. It is well to make the stretchers and cleats of maple even if the rest of the table is made of pine.

Method of Procedure

1. Glue up the top, using dowels and preferably casein glue.
2. Dress down both sides and sand to a smooth, even surface.
3. Round and smooth the edge of the table with spokeshave or rough file and sandpaper.
4. The uprights should be accurately squared up to finished dimensions. The two may then be bradded together through those portions of the wood later housed in the mortises. The uprights may then be cut out on the jig saw or on the band saw, or if necessary, by hand with a fret saw.
5. Cut the mortises in the feet before sawing out the latter to the outline shown. After the feet are finished, assemble them with the lower stretcher (part 2) without glue and try them on a level surface for rocking. If one bearing point stays up, the opposite corners of one tenon on the stretcher should be trimmed off and the mortise cut out until the feet can be twisted to bear properly. After applying the glue, adjust the feet to the flat surface as shown in Figure 1 and then clamp. After the glue has set, pin the joints with ⅜-in. dowels.
6. The uprights and shelf should then be glued together, after which the entire base unit should be assembled. Then glue on the cleats, sighting across their upper surfaces to get them in alignment. Do not forget to pin all of these joints together with dowels. Trim off all excess glue. Round off the sharp corners and sand all parts thoroughly. The top is to be finished separately and screwed in place as the final step.

Method of Finishing

1. Give the wood a sponge bath with clear water to raise the grain. This also serves to raise to the surface accidental depressions caused by handling. Allow two hours or more for drying. Then sand thoroughly all over with clean-cutting 2/0 sandpaper. For the flat surfaces, use the sandpaper wrapped around a block.
2. Apply early American, old pine, or antique maple, acid or water stain. If it is desired to match the finish to other furniture, any necessary darkening of the stain may be done by mixing it with a similar stain of darker tone. Allow stain to dry six or seven hours, then sand and give a seal-coat. This may consist of thin white shellac, that is, the commercial 4-lb. cut to which an equal amount of alcohol has been added. Or a thin lacquerlike "color developer" may be used.

This will give a thin transparent coating over the stain and brings out the beauty of the grain remarkably. If a thin type of finish is desired, apply a second seal-coat after sanding the first lightly and apply two coats of wax, well rubbed. A more durable finish is obtained by applying one or two coats of rubbing varnish after the first seal-coat, and rubbing with pumice and oil.

Fig. 1. Gluing up the stretcher and feet. Fig 2. The finished instep table

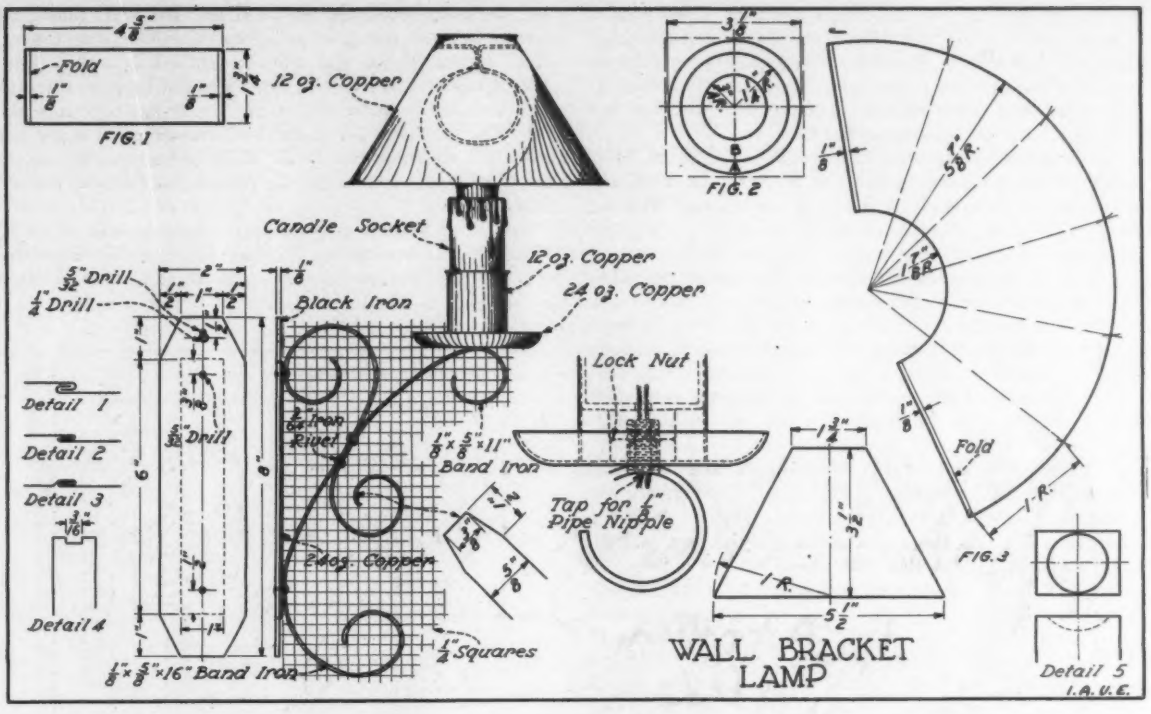
WALL BRACKET LAMP

O. A. Northquest, Public Schools, Milwaukee, Wisconsin

The hand-wrought copper wall lamp described herewith is very popular with our junior-high-school boys. It is of colonial design and may be used as a hall lamp, a bed lamp, a porch lamp, or it may be placed over the fireplace, or on the wall directly over a chair.

It can be made readily by eighth- or ninth-grade students. The average boy will complete the lamp in twenty clock hours of working time. Where the classes are small, students will usually finish the project in less time.

It is recommended that the student make the back bar first. Saw off a piece of mild steel ⅛ by 2 by 8 in. Square both ends and proceed to make the layout as shown. After the ends have been shaped, draw a center line down the center of the piece the long way. On this line locate and center-punch the position of the holes which are necessary to hang the lamp on the wall. Drill them and then file away the metal remaining between the holes. Now peen the front side of the bar. This is done by laying the bar on the anvil and striking it with the face side of a small ball-peen hammer. Do not strike the metal hard and have the blows contact the metal at an angle. Now give the bar a thin coating of linseed oil, after which place the bar into the furnace and burn the



oil until the bar is a dull black. Then rub the bar with emery cloth to touch up the high spots thus producing a light and dark effect. To preserve this finish, give the bar a coat of wax and allow it to dry. Then polish it with a clean soft cloth. This finish is called a colonial finish.

Cut a 1 by 6-in. piece of 24-oz. copper and square both ends. When filing thin copper, hold it against the edge of a wood block with the thumb. If it is placed into a vise, it will be marred. Now draw a line down the center the long way of the copper strip. On this line locate the necessary holes and then drill them with a 5/32-in. drill. Place the copper strip on the back bar, and from it locate the holes on the bar and drill them.

The scrolls are made from two pieces of mild steel ⅛ by ⅝ by 11 and 16 in. respectively. Shape both ends of each piece as shown in the drawing. Prepare and finish them just as was with the back bar. Do not peen them hard, for this will tend to make them tough. The scrolls are shaped over a ½-in. pipe held in a vise. Start rounding the pieces on the end and work toward the opposite end. If this is not done, it will be difficult to get the scroll shaped properly. Start with the small scroll for this is not so difficult to form as the large one.

When assembling the lamp, fasten the two scrolls together before assembling the scrolls and the bar. Rivet the two scrolls together with two 9/64-in. rivets. When this is done, place the scrolls on the bar. Locate the necessary holes and drill them. Place the copper on the bar and proceed to assemble the three parts.

The next step is to drill and tap the small scroll. Be sure that the hole is drilled through the topmost part of the scroll. If the hole is drilled to one side, the candle fixture will not set upright. Tap the hole with a ⅛-in. pipe tap. Screw the brass pipe nipple in place. Be sure that the ends of the nipple are smooth, otherwise the insulation on the electric wires may be cut.

The next step is to make the copper drip cup. Cut a 3¼-in. square out of a piece of 24-oz. copper. Locate the center, and center-punch it lightly. Draw as large a circle as is possible in this square. Cut it out and file the edges smooth. Draw two circles on this piece with radii of 1¼ and ¾ in., as shown in Figure 2. Then comes the raising operation. Secure a lightweight machinist's ball-peen hammer with a smooth ball. In the end grain of a soft pine block, drive down an impression as shown in Detail 5. This is done by holding the block in the vise and using the ball side of the hammer to make the impression. Do not make the impression deep, as a shallow one will work very well. Lay the copper over the impression and with a 1, 2, 3 rhythm, proceed to set the metal down. This procedure is termed "raising."

While raising, move the metal in a circular motion and stay in the section marked *A* until a complete revolution has been made. Then proceed to section *B*. Strike all of the hammer blows with the same degree of hardness to insure an even raise. If the metal becomes too tough to work, heat it to a red heat and submerge it in cold water. This, however, should not be necessary when making this drip cup. When the metal has been raised to the desired depth, turn the cup over and tap it lightly to even it up somewhat. Now sight across the top edge and mark all of the high spots. Then file these spots down. With this done, round the edges with a fine grade of emery cloth. Next, drill a 7/16-in. hole through the center of the cup.

The candle holder shown in Figure 1 is made from a 1¾ by 4¾-in. piece of 12-oz. copper. Square both ends. Then draw a ⅛-in. folding line at each end. Place the piece over the edge of a sharp block with the line directly over the edge of the block, and with the small hammer proceed to fold it as shown in Detail 1. Then hook the two ends together as shown in Detail 2. Slip the piece over a pipe and tap the metal lightly until the holder is cylindrical. Then set the joint as shown in Detail 3 by using a grooving tool. If no tool is at hand, one may be made from a piece of square stock as shown in Detail 4. The top end may now be flared

by placing the edge of the holder over the sharp edge of a block and with the ball end of the hammer tap the holder lightly as it is rotated. Proceed in this manner a second time, extending the top just a bit more. Then turn the holder upside down on a smooth surface and tap it lightly. This will tend to smooth out all irregularities.

The shade is made from a 6 by 12-in. piece of 12-oz. copper. Make the layout as shown in Figure 3. Cut it out with a circular tin snips and file it out. Draw the fold lines and proceed to make the joint used in the holder. Shape the shade by working it over a pipe. Sight across the top and file down all high spots. Do likewise for the bottom. Flare the top and bottom of the shade.

Clips for holding the shade onto the bulb may be made from two pieces of 16-gauge spring-brass wire, 11 in. long. Bend as shown in the drawing and twist them together. Solder the twisted portion to hold it securely. Bend both ends so that they will fit against the side of the shade, then solder them to the shade.

If a natural copper finish is desired, each piece of copper should be polished with 2/0 steel wool. To preserve the polish, give the surface a coat of clear lacquer. Wax will preserve the finish for a short time only. If an oxidized finish is desired, clean the surface well and then place the pieces in a solution of liver of sulphur or of barium sulphide. The barium sulphide may also be applied by wetting a cloth with it and then rubbing it over the surface of the metal. When the surface has been darkened, wash it and then rub with steel wool until the desired effect has been obtained. To preserve this finish, apply a coat of clear lacquer or wax. The lamp is then ready to be wired.

JIG FOR MAKING COMMUTATORS FOR SMALL D.C. MOTORS

Walter B. Weber, State Teachers College, Buffalo, New York

Every electrical-shop instructor knows the difficulty of making good commutators, especially when there is no lathe available for turning. Since "necessity is the mother of invention," the writer devised this simple fixture for making such commutators which will revolve true even though they are not made on a lathe. The jig can be so designed that two- or four-bar commutators can be made. Of course, a lathe or drill press must be available for making the jig.

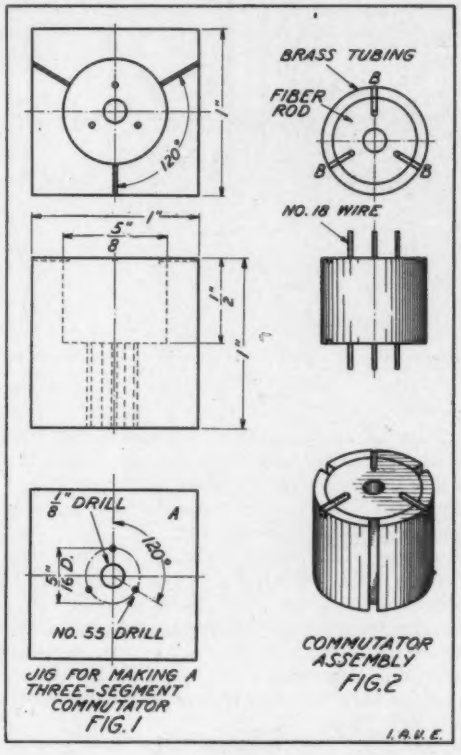
Procedure

Take a short piece of 1-in. square cold-rolled steel, and chuck it in the lathe. Face off one end. With a small chuck. and a ⅛-in. drill in the tailstock, drill a hole in the center of the faced end 1⅛ in. deep. Place a ⅝-in. drill in the tailstock and drill a hole ½ in. deep, using the ⅛-in. hole as a center. See Figure 1. Next, bore the bottom face of the hole so that it is parallel with the top face. Cut off the piece, making the jig 1 in. in length. Copper-plate face A with copper sulphate (bluestone). Center-punch the center of a short piece of ⅛-in. rod and place it into the jig. Use this center-punch mark to scribe a circle with a radius of 5/32 in. Divide the circumference of the circle into three equal parts and carefully center-punch 120-deg. marks. Drill the three holes with a No. 55 drill, which is the proper size to accommodate No. 18 bare copper wire. Slightly countersink the three small holes on face A. The last operation is to saw three shallow slots into the top face with a hack saw. These slots also should be 120 deg. apart and in the center of the three No. 55 drill holes. The slots are used to mark the commutator for cutting brass tube into three equal segments. If so desired, the jig may now be casehardened.

Commutator Assembly

Saw off a ½-in. piece of ½-in. brass tubing with 1/16 in. wall thickness. Press the fiber rod into the brass tubing by placing between the jaws of a vise. File both ends square. Place it into the jig, and drill the center hole with a ⅛-in. drill. Then drill one of the No. 55 holes. Remove the drill and place a 1-in. piece of No. 18 bare copper wire into the hole. This will hold the commutator from turning in the jig. Drill the remaining two holes. Mark end of commutator at the three points located by the slots in face A, and remove from jig.

Saw three shallow grooves into the brass tube as at B, Figure 2, to accommodate the No. 18 wires. These grooves help to hold the commutator segments in place. Cut three



JIG FOR MAKING A THREE-SEGMENT COMMUTATOR
FIG. 1

FIG. 2

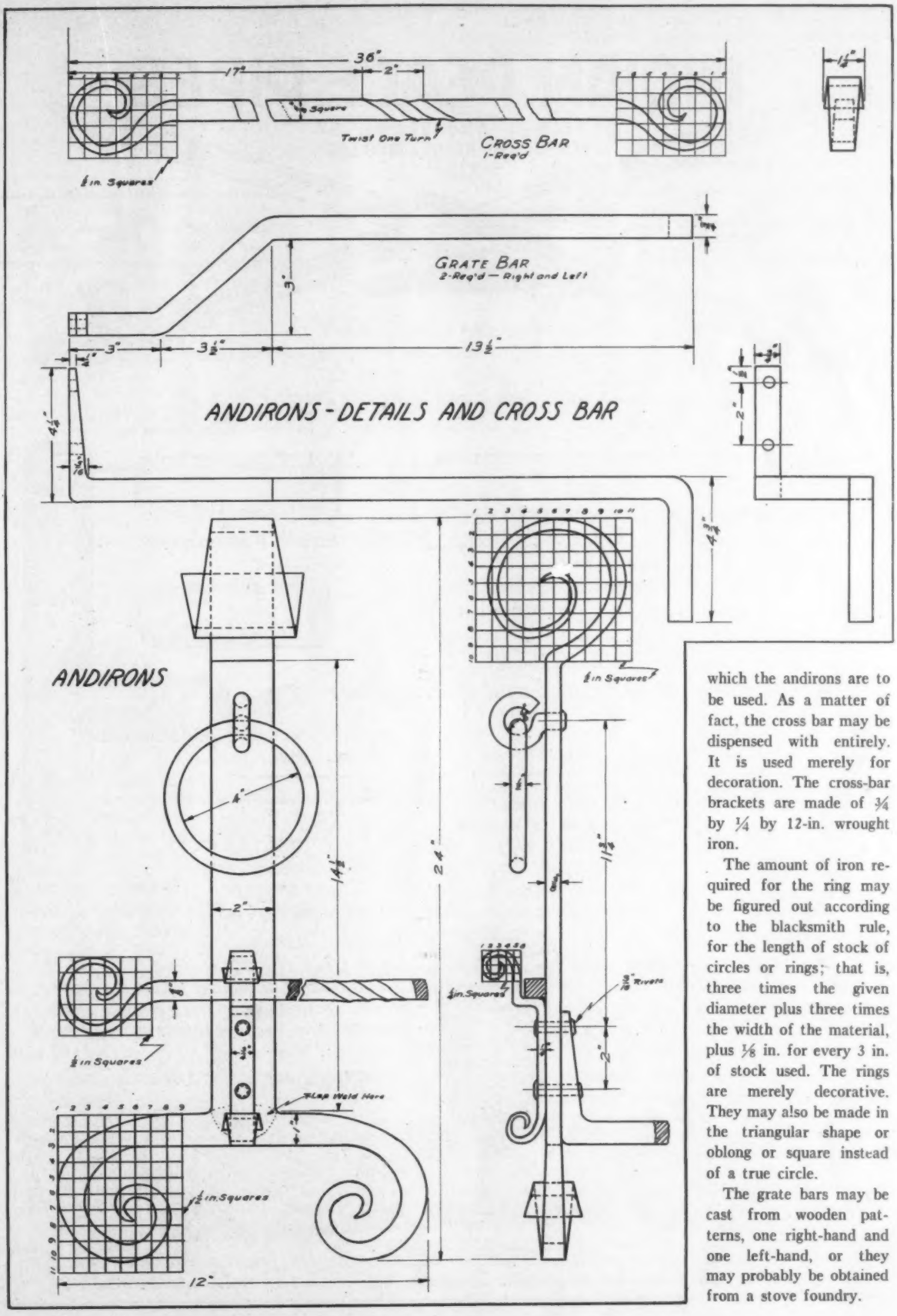
pieces of No. 18 bare copper wire 1 in. long and insert them into the three holes. Bend the ends up and into the grooves. Cut off flush with outer edge of brass tubing, and solder wires to the brass tubing. Place commutator in vise, and with a hack saw, cut the brass tube into three equal parts or segments. It will be noticed that the segments are held securely by the three wires. This assembly makes an excellent true-running commutator for a 3-pole armature.

HAND-WROUGHT ANDIRONS

David F. Jackey, State Teachers College, Chico, California

The hand-wrought andirons illustrated and described herewith combine the processes of drawing out, lap welding, forging a circle, hot riveting, and the bending of irregular curves.

The first thing to make is the two feet. The next thing is the uprights. For each of the feet a piece of ⅜ by 1 by 31-in. wrought iron is required. For each stand a piece ⅜ by 2 by 28 in. The cross bar is made of a piece of ⅝ by ⅝ by 38-in. wrought iron. This latter dimension may vary somewhat because it may be made to suit the type of fireplace opening for



which the andirons are to be used. As a matter of fact, the cross bar may be dispensed with entirely. It is used merely for decoration. The cross-bar brackets are made of ¾ by ¼ by 12-in. wrought iron.

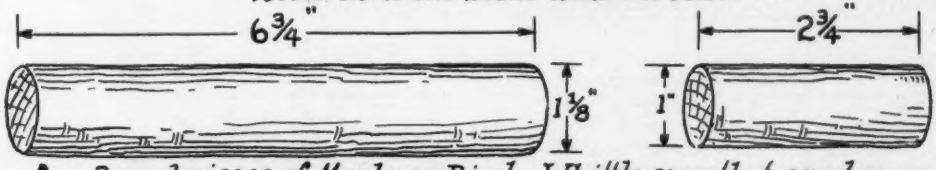
The amount of iron required for the ring may be figured out according to the blacksmith rule, for the length of stock of circles or rings; that is, three times the given diameter plus three times the width of the material, plus ⅛ in. for every 3 in. of stock used. The rings are merely decorative. They may also be made in the triangular shape or oblong or square instead of a true circle.

The grate bars may be cast from wooden patterns, one right-hand and one left-hand, or they may probably be obtained from a stove foundry.

INDIAN PEACE PIPES

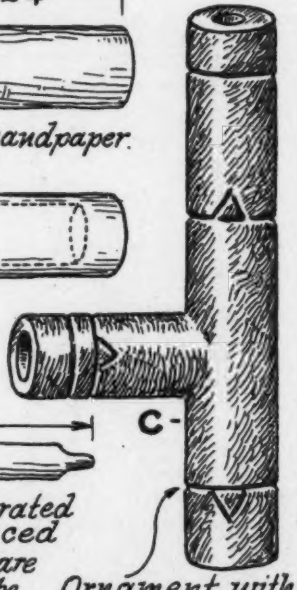
DESIGNED AND DRAWN BY
W. BEN. HUNT - HALES CORNERS, WIS.
-1935-

As these pipes are merely used as ornaments or at most in a symbolic way, it is not necessary to drill holes thru the stem and the bowl.

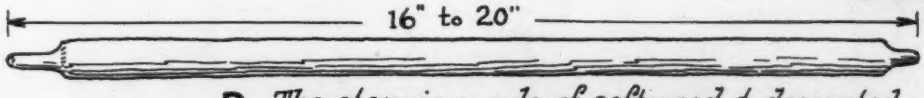


A – *Round pieces of Maple or Birch. Whittle smooth & sandpaper.*

B – *Bore holes as indicated and glue together*



C -



Section of Stem.

D - *The stem is made of softwood & decorated with black & red water color & shellaced. Feathers, fur, buckskin and red flannel are used to ornament the stem. These may be fastened on with glue or tied with thread*

Ornament with "V" cuts made with knife.

To put a realistic finish on the bowl which looks like real pipestone, take cream or buff colored flat wall paint and add red lead and a little lamp black to get a brick red color. Do not thin it. Put a stick into the stem hole to hold it, and apply the paint with a finger. When ornaments fill up with paint, scrape them out with a pointed stick. A second coat may be applied if the first does not look smooth enough.

Run a hot iron around inside of bowl to give it a used look.

This pipe bowl is 6" long and 3" high, and was cut from a piece of wood 1⅛" square. The teeth are glued in place after the mouth is carved out.

OPERATION SHEETS FOR MACHINE WOODWORK

V. E. Broadbent, Santa Clara, California

Crosscutting on the Universal Saw Table

Tools

Double-arbor universal saw table, try-square, scale.

Directions

1. Fasten the cut-off fence to the sliding table with pins and screw.
2. Unlock the sliding table.
3. Inspect the table-tilting quadrant of the end of the table to see if it is square with the saw. Turn the table-tilting wheel, if necessary.
4. Unlock the saw-shifting wheel and turn up the crosscut saw until it barely projects above the wood to be cut. Lock, but *not too tightly*.
5. Turn on the power and see if saw wabbles. Report it to the instructor if it does.
6. Place the stock against the cut-off fence with the working edge against it.
7. Hold the wood firmly with the left hand and push the sliding table forward, holding on to the handle on the fence.
8. Do not push too fast. Give the saw a chance to cut smoothly.
9. Never push against the wood to the right of the saw or a wedged saw may result with a probable kick-back.
10. If a long board is to be cut into several short lengths of uniform size, place the ripping fence on the table and attach the cut-off block (see Fig. 1). Set the ripping fence

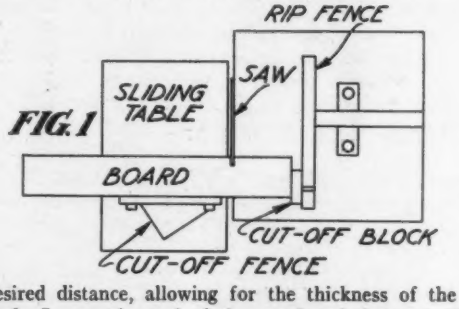


FIG. 1

the desired distance, allowing for the thickness of the cut-off block. Square the end of the wood and then cut off the lengths by pushing the wood against the block as a gauge.

11. Never use the ripping fence as a gauge in crosscutting without attaching the cut-off block, or a serious accident is likely to happen.
12. When several short, separate boards are going to be cut to the same length, square up one end of each board. Then attach the cut-off rod to the cut-off fence (see Fig. 2) and set the sliding stop the desired distance from the saw.

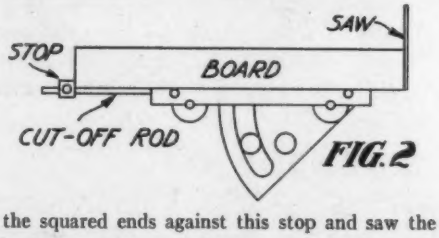


FIG. 2

Place the squared ends against this stop and saw the second ends.

13. When cutting off boards longer than 6 ft., have a helper hold the long end, being careful to let you do all the shoving.
14. When a long board is to be cut in two, it may be held against the cut-off fence on the locked table by two helpers while you turn the saw through the wood by means of the saw-changing handwheel.

Questions

1. Why is it wrong to use the ripping fence as a cut-off guide without the cut-off block?
2. If several long boards are to be cut to the same long lengths, what would be the most accurate way to mark them?
3. Where should the lines be marked on the wood for accurate sawing?

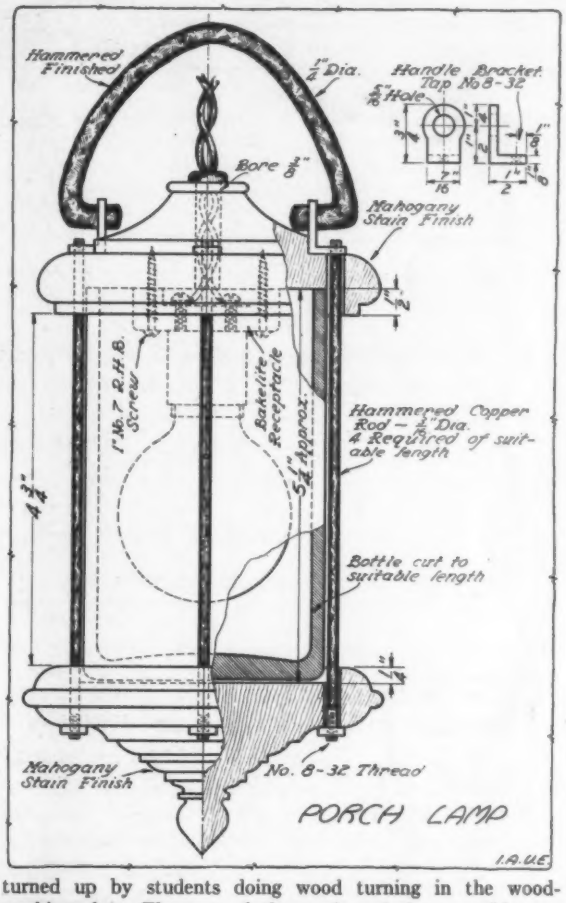
Reference

Hunt's *Manual for Machine Woodworking*, pp. 26–30.

PORCH LAMP

H. Howes, Seattle, Washington

The porch lamp shown and described in this article is commendable both on account of its beautiful appearance and because of its low price. The tops and bottoms may be



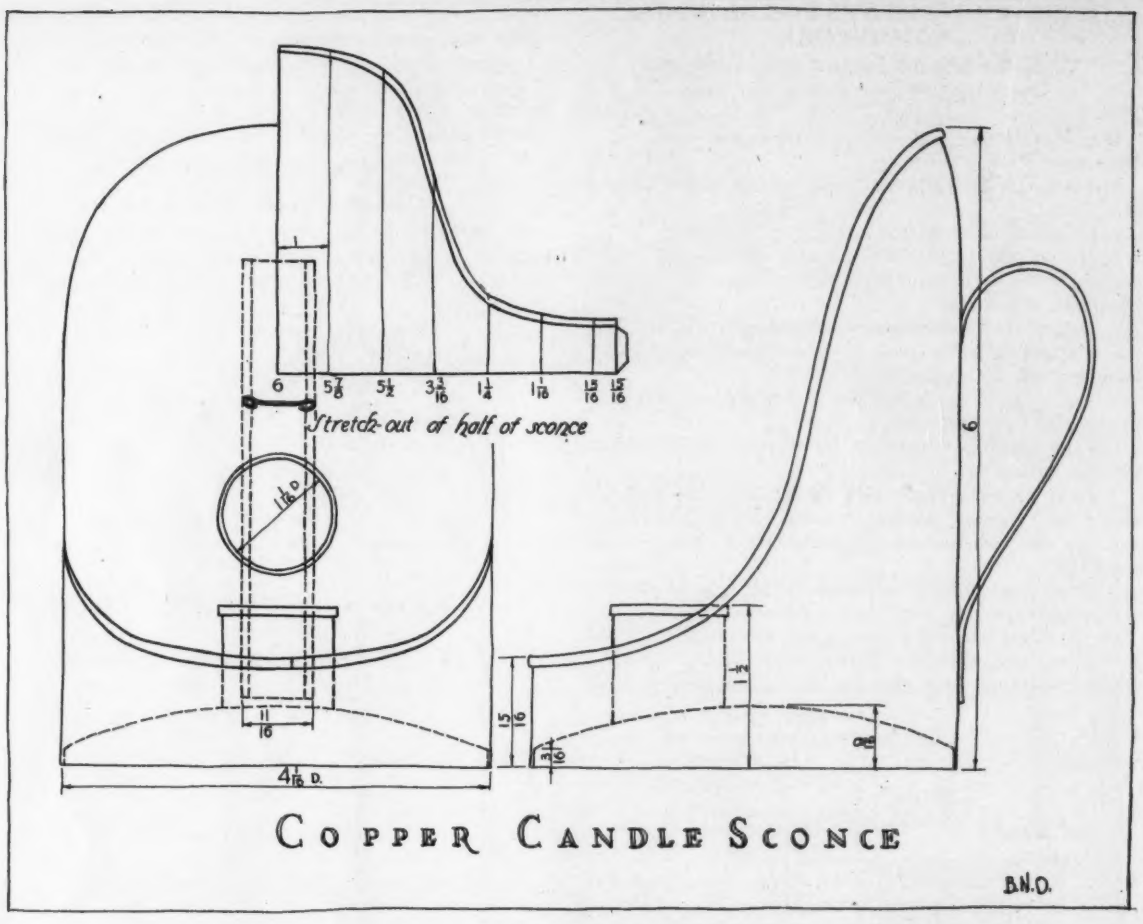
turned up by students doing wood turning in the woodworking shop. The rest of the work and the assembly can be taken care of by students in the general metal classes or in the general shop.

PAGES FROM A MUSEUM SKETCHBOOK

Burl N. Osburn, State Teachers College, Millersville, Pennsylvania

Copper Candle Sconce

This copper candle sconce is a common type which has persisted over a long period of time. It is made from four pieces of metal. The socket is a strip with a single lap edge, rolled to shape, and soldered along the joint, and to the base. The base is domed, with a flange turned around the edge to give greater surface at the point of contact with the side. The stretch-out for the side is shown in smaller scale. To this is added about ⅛ in. for a single lap edge which is hammered down quite close. The two ends meet at the front where they are hammered out to a single thickness after soldering. An element of some difficulty is introduced in the slightly rounded top, as shown in the side view. The original shape of the handle cannot be determined, as it is obviously bent out of shape.



Copper Candle Sconce, submitted by Burl N. Osburn

THE MORTISE-AND-TENON JOINT — III

John E. Doren, High School, Eureka, California

(Part I appeared on page 136 of the March, 1934, issue of this magazine, and Part II on page 164, April, 1934.)

B. Factors that Influence the Width of Tenons

1. Narrow rails under 4 in. wide should be single tenons, while rails over 4 in. wide should be provided with double or multiple tenons (see Fig. 7).

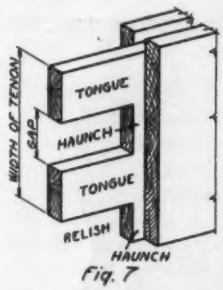


Fig. 7

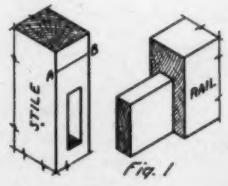


Fig. 1

2. In cases where the edges of rails must finish flush with the ends of stiles, the tenons must be relished, that is, reduced in width at one edge only, to permit of closed end mortises in the stiles (see Figs. 1 and 10). The amount of relish varies with the size of the work and the judgment of the detailer or the workman, but it is common practice to relish one edge of tenons from ¼ to 1 in. when making small panels or doors of 1-in. lumber, and ½ to 1½ in. when making panels or doors of 2-in. lumber. Personal judgment must be used in each case; there is no standard practice in this matter.

3. The depth of grooves in edges of rails (see Figs. 11 and 12).

FIG. 10

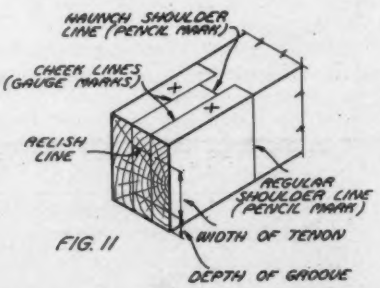


FIG. 11

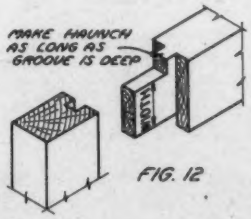


FIG. 12

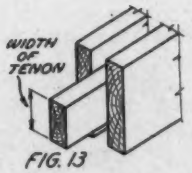


FIG. 13

a) Rails grooved on one edge.

b) Rails grooved on two edges (see Figs. 13 and 14).

4. The depth of rabbet in edges of rails. When the rabbet cuts away from one half to two thirds of the width of the

edge face, it has a marked influence on the width of the tenon, but this reduction in width must not be confused with the reduction due to relish.

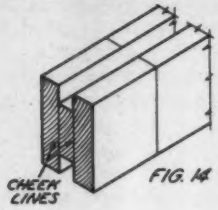


FIG. 14

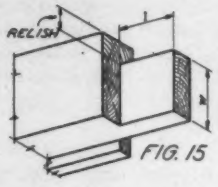


FIG. 15

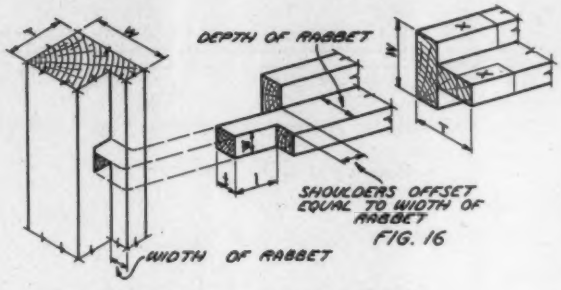


FIG. 16

a) Rails rabbeted on one edge (see Fig. 15).

b) Rails rabbeted on two edges (see Fig. 16).

C. Factors that Influence the Length of Tenons

1. The through tenon. The through tenon passes entirely through the adjoining member of the work and from this fact it gets its name. The tenon is usually made ¼ in. longer than seems necessary to permit of its being finished flush with the surface of the work from which it protrudes.

The length of the through tenon is influenced by:

a) The width of the adjoining or mortised member plus

b) The overlength ¼ in. more or less, to allow for finishing later (see Fig. 17).

2. The blind tenon. The blind tenon gets its name from the fact that when the point is assembled, the tenon is entirely concealed. There are two varieties of blind tenons, the long blind tenons, and the stub blind tenons.

FIG. 17

a) The length of the long blind tenon is influenced by:

(1) Common practice

(*a*) The length of the tenon is usually made from four to six times its own thickness, or

(*b*) The length is made approximately equal to two thirds the width of the adjoining member.

(2) Characteristics of the equipment

(*a*) The length of the mortising chisel in the case of machine-made mortises.

(*b*) The length of the stroke or travel of the mortising machine.

(*c*) The capacity of the tenon machine or other machines used for cutting tenons.

b) The length of the stub tenon (very short tenon) is also influenced by:

(1) Common practice

(*a*) The length of the stub tenon is usually made equal to its own thickness in the case where the adjoining member has plain square edges.

(*b*) The length of the stub tenon is influenced by the depth of the groove in the case where the adjoining member is grooved on the edge.

Reasonable proportions for tenons and the factors that influence the actual dimensions will become clearer as specific cases are considered in the series that follows.

(To be continued)

OPERATION SHEETS FOR MACHINE WOODWORK

V. E. Broadbent, Instructor Industrial Arts, Santa Clara, California

Operating the Band Saw

Use

The band saw is used mostly for sawing outside curves, but is useful in cutting heavy, hard woods that would burn the circular saw.

Tools

Band saw, try-square.

Directions

1. See if the saw is in the middle of the upper and lower wheels and in the upper and lower guide slots (see Fig. 1). Saw should not ride heavily against the guide wheels. If not in proper adjustment, notify the instructor before using.

2. Test the table for squareness with the side of the saw blade. If not, adjust by means of the table tilt, until the try-square tests all right.

FOR YOUR BULLETIN BOARD

POSTER 63 **OCTOBER, 1935**

To succeed with any work, you must concentrate your mind on it.

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Submitted by Professor L. M. Roehl, Cornell University, Ithaca, New York

3. If the curves to be cut are very short and the saw blade is wide, notify the instructor, who will change the saws.

4. Set the upper saw guide just high enough above the table for the wood to pass under it.

5. Before sawing, study the work to determine how it should be cut, especially if it contains sharp curves and bends.

6. If it is necessary to pull a board back out of a cut, do so very carefully or the saw will be pulled off the wheels.

7. Avoid long back-ups by putting in short saw cuts at sharp turns, as in Figure 2.

8. When sawing curved work use one hand as a pivot and push the wood with the other hand.

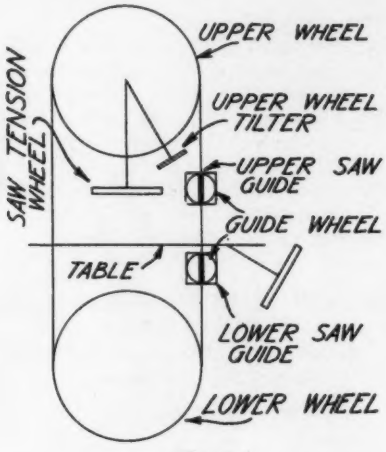

Fig. 1

9. Do not attempt to saw through the middle of a line. Saw just outside so as to leave a guide for finishing.

10. In making sharp turns, back up slightly and then go ahead again, repeating the process rather than forcing the saw to twist sharply.

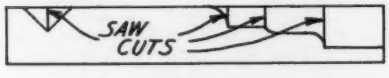

Fig. 2

11. If the saw begins cutting the line, back up the wood slightly and change to the correct direction, rather than attempting to twist the saw around in the cut without backing up.

12. Do not allow onlookers to stand to the right of the saw (in line with the saw). A broken saw might hit them.

13. Never attempt to pick small pieces of wood out of the saw groove around the saw while it is in motion.

14. The ripping fence may be used for cutting thin, soft wood, but the blade is too small to rip heavy work accurately.

Questions

1. Do you think joints should be cut on the band saw?

2. How can time be saved if several boards are to be cut with the same curves?

3. Is there any danger in cutting off round rods or dowels on the band saw?

4. How can this be prevented?

Reference

Hunt's *Manual for Machine Woodworking*, pp. 110–115.

Squaring Stock by Machinery

Machines

Jointer, universal saw table, surfacer.

Directions

1. Cut the stock slightly over the finished length, using a handsaw or circular cut-off saw.

2. Plane the first working surface true on the jointer and *mark*. (See "Operating the Jointer.")

3. Plane the first working edge true on the jointer, holding the first working surface against the fence. *Mark*.

4. Set the circular ripsaw to the finished width plus ⅛ in. and rip, holding the working face down and the working edge against the rip fence. (See "Ripping on the Universal Saw Table.")

3. Set the ripsaw to the desired thickness plus ⅛ in. and rip.

6. Set the jointer to plane ⅛ in. and run the ripped edge and surface each through *once only*.

7. Square one end by the use of the circular cut-off saw and *mark*. Hold the first working edge against the cut-off fence. (See "Crosscutting on the Universal Saw Table.")

8. Cut to the desired length with the circular saw.

9. In case the rough stock is straight or does not have to be absolutely true lengthwise, it can be run through the surfacer first until with both surfaces planed it reaches the correct thickness. This is for stock that will be held straight

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by other pieces, as for example, table tops. In any case a working surface must be chosen and marked.

10. Duplicate parts should be squared up at the same time, using the same machine set-up to get the parts alike.

11. In case several pieces of the same width are to be ripped from a wide board, plane one edge true and then rip ¼ in. oversize. Then set the jointer to cut ⅛ in. and run both edges of each board through.

12. Be particularly careful when planing the first surface of a thin board on the jointer.

Questions

1. What is the objection to planing table legs to the correct size in the surfacer?

2. If several short pieces of the same width are needed, how should Direction No. 1 be amended?

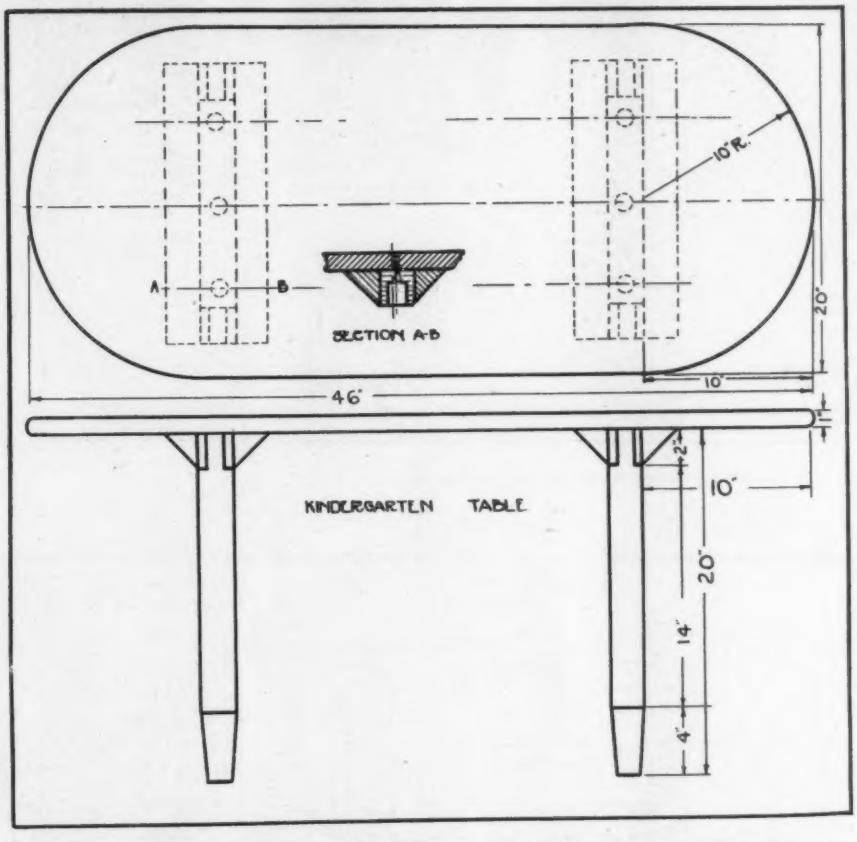
3. What objections are there to regularly ripping stock from wide boards as in Direction No. 11?

References

Hunt's *Manual for Machine Woodworking*, pp. 75–80.
Griffith's *Woodwork for Secondary Schools*, pp. 76–78.

KINDERGARTEN TABLE

Rosell J. Manchester, Auburn, New York



The kindergarten table described herein seats six children. The tables were made in the carpentry department of the part-time-school.

They are made of oak throughout. Some were filled with golden-oak filler and shellacked; others were enameled an apple-green color.

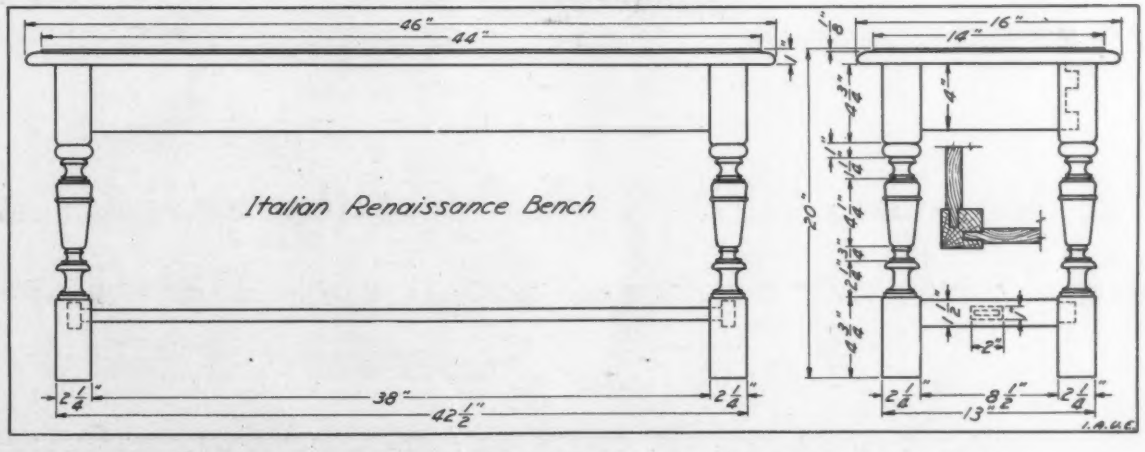
DRILL PRESS

C. H. Niemann, Hammond, Indiana

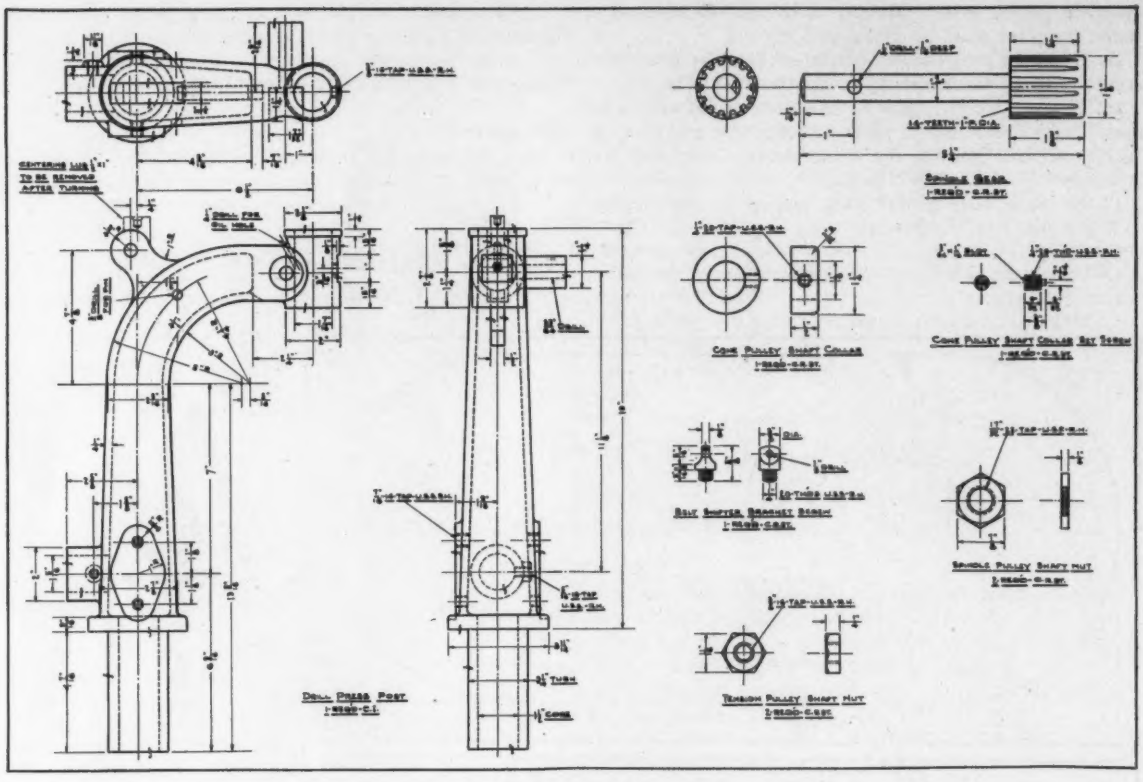
The details and assembly of the drill press are presented for the purpose of giving a project that offers some good material for the pattern shop, machine shop, and drafting room.

Even though it were impossible for any one or more students to finish the complete drill press, the work and instruction involved in producing the patterns, casting, and other parts of a definite unit will create more interest than if the students are put to work on disconnected jobs.

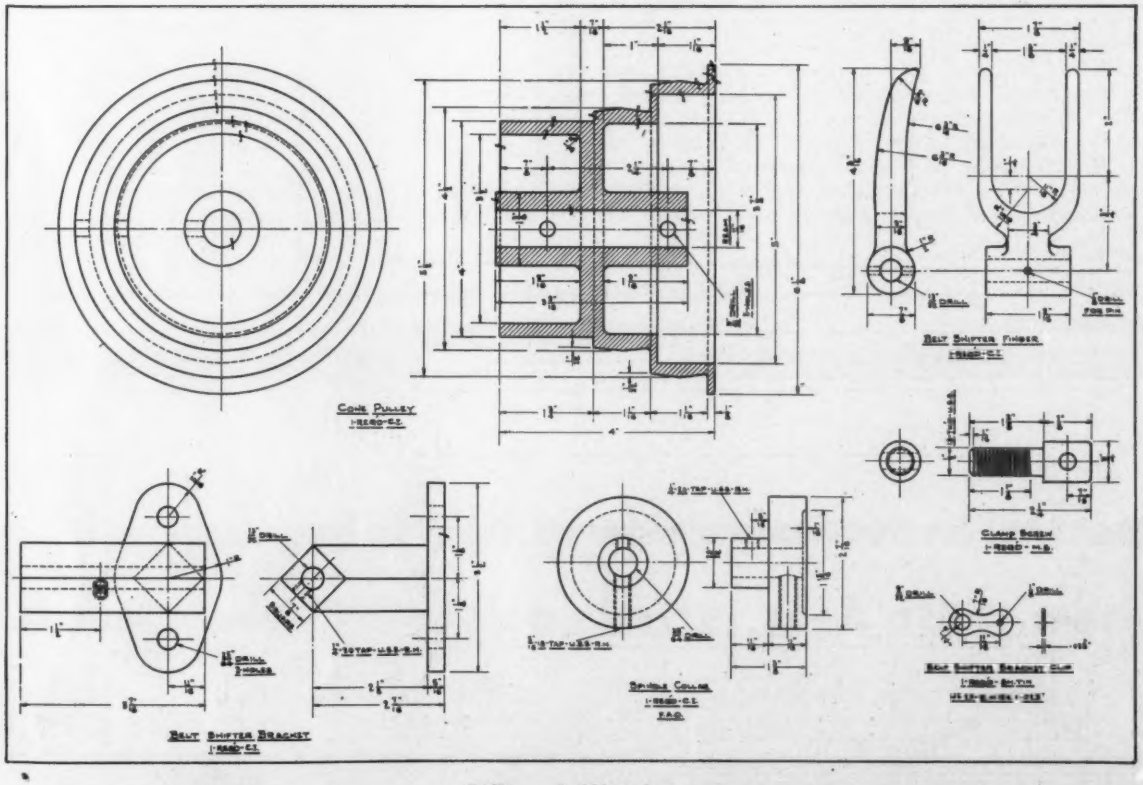
A suggested drafting job is to have the student make a sectional view from the plain view of the tension pulley or loose pulley, etc.



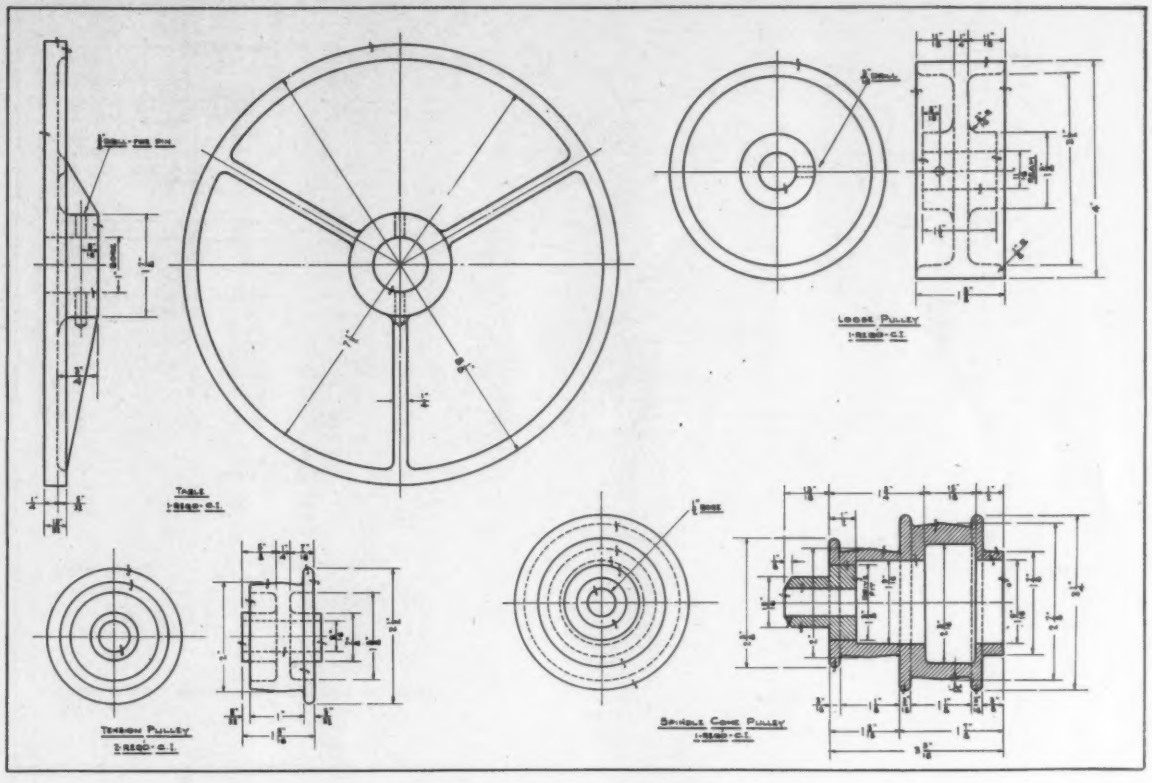
Italian Renaissance Bench designed by Reinhold Forkel, School of Industrial Arts, Trenton, New Jersey



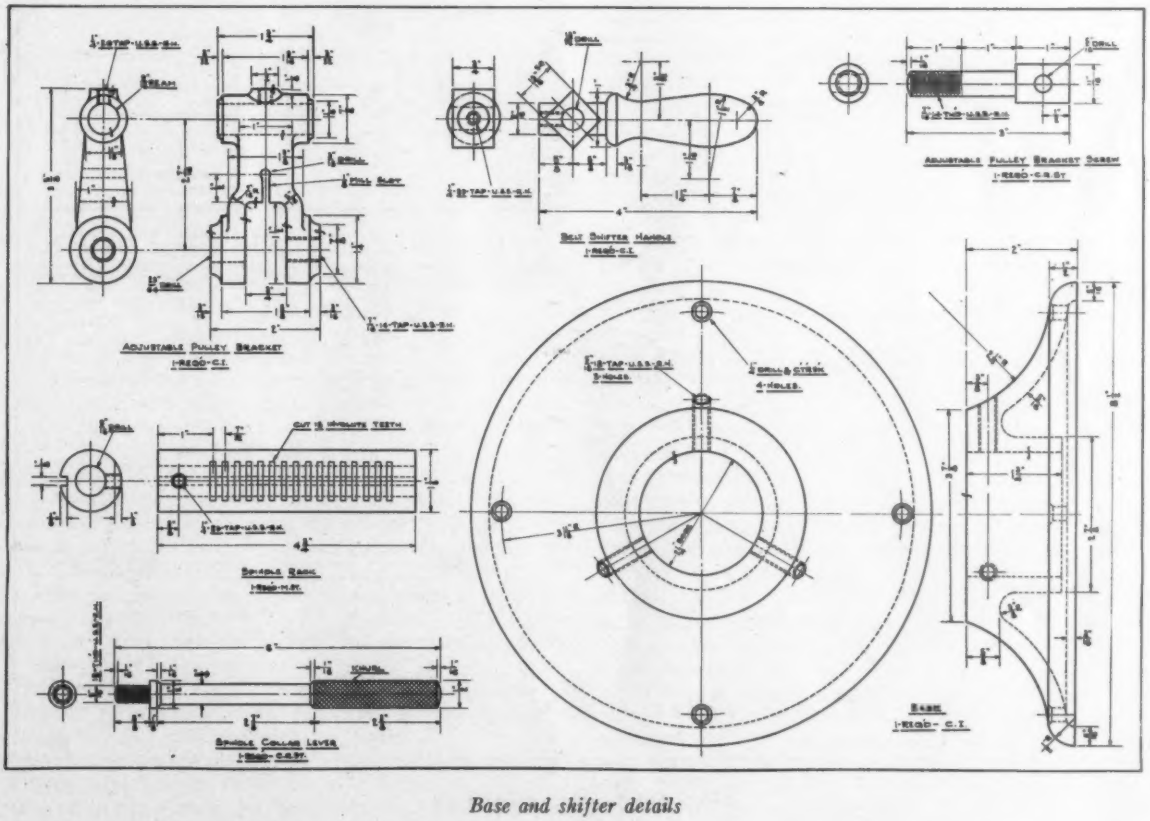
Drill-press post and spindle-gear details



Pulley and shifter finger



Drill-press table and pulleys



Base and shifter details

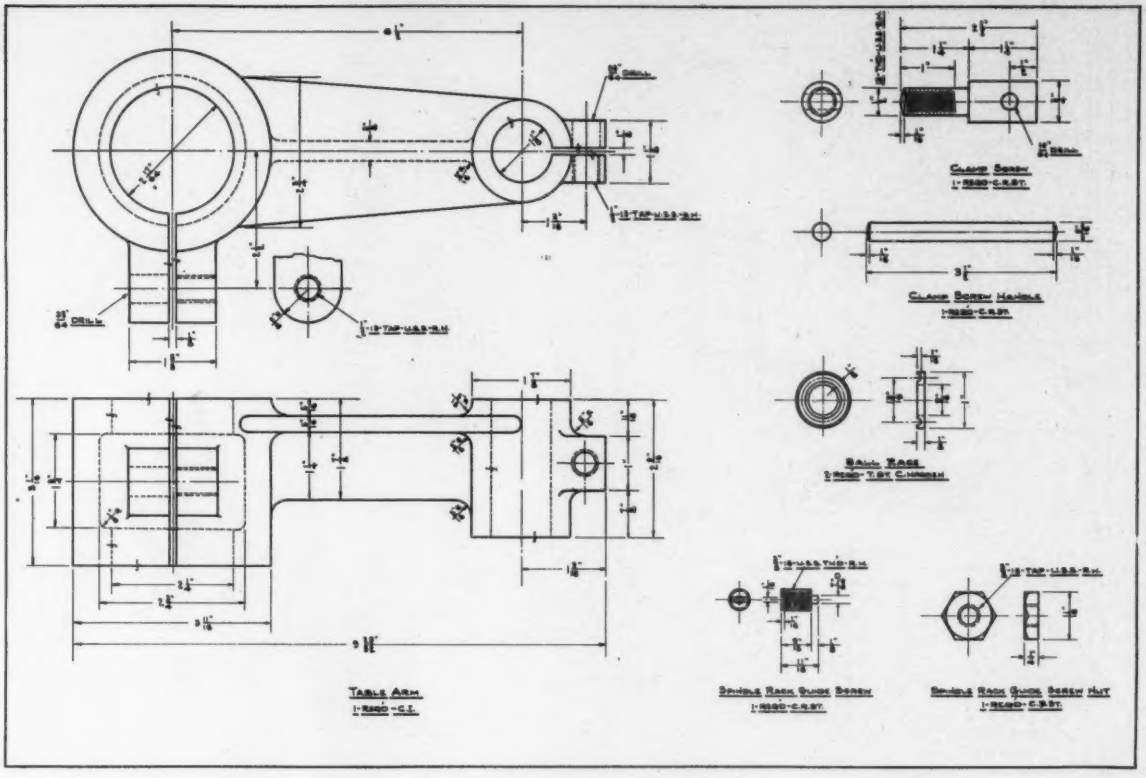
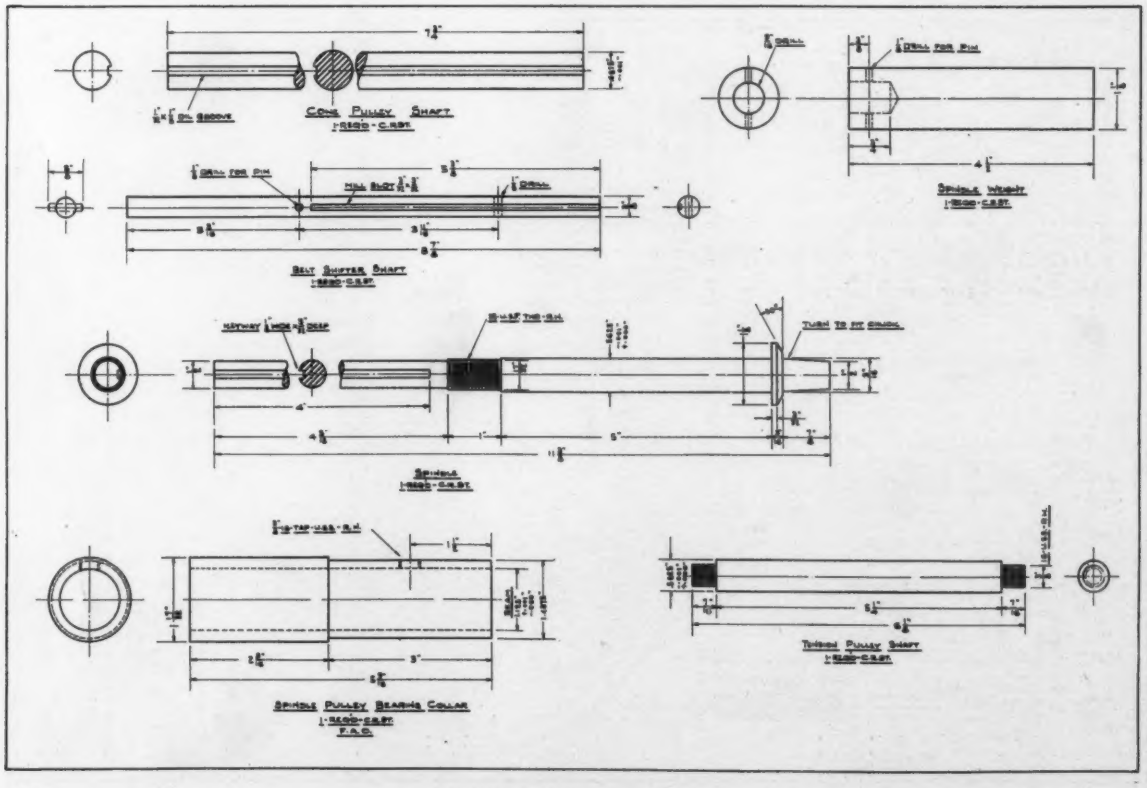
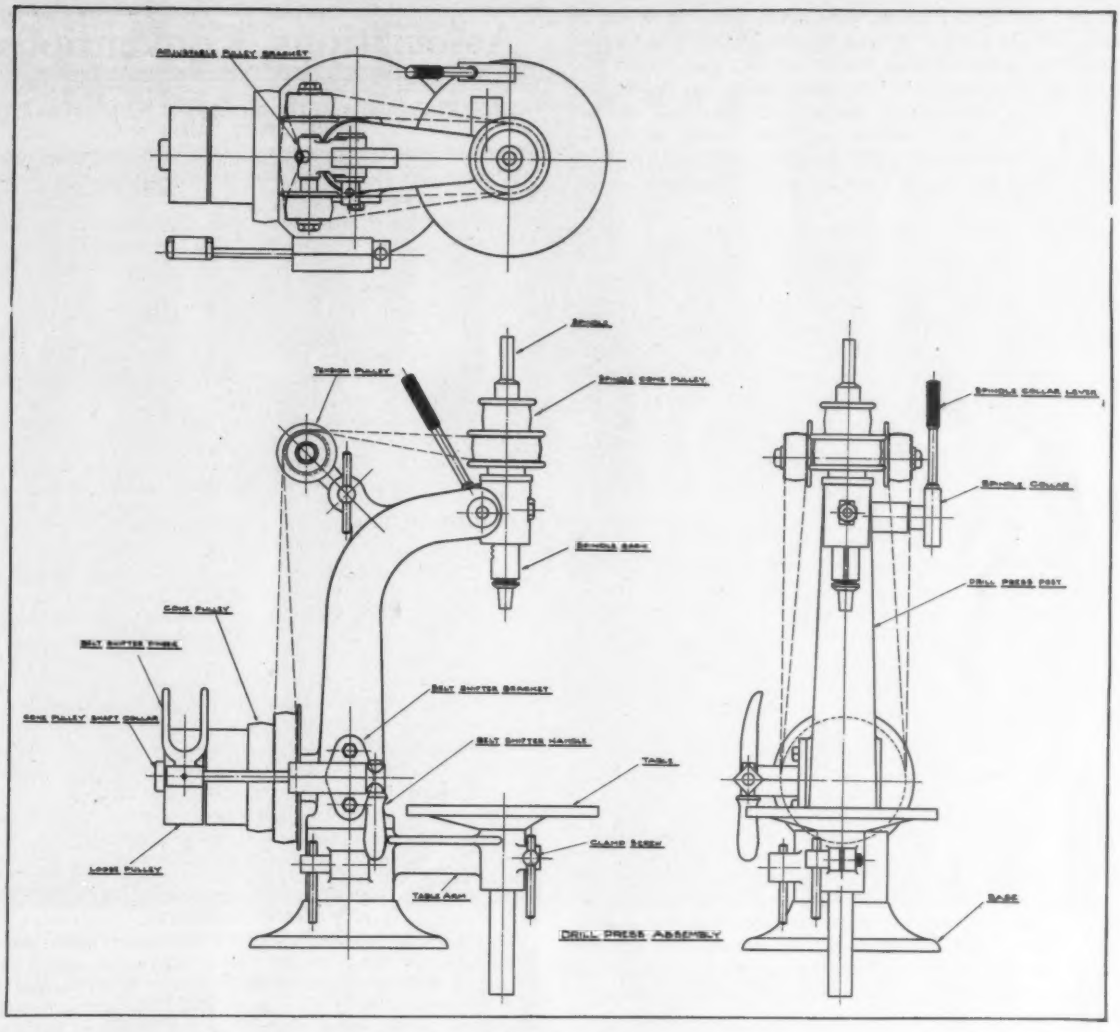


Table arm for drill-press table



Shafts and spindles for drill press



Drill-press assembly

Some Questions Answered

MAKING KNIVES OUT OF FILES

994. Q.: Can you give me any information on the manner in which ordinary mill files should be treated and retempered to make hunting knives? Our efforts so far have not been satisfactory, but I believe knives with a uniform edge neither too soft nor too brittle can be made from a mill file.—*W.W.W.*

A.: Yes! File steel will make a very satisfactory knife if properly worked and treated. I have made a great many knives of all descriptions from this "old file steel." I have also made springs of all descriptions from this material with fine results. The finest cutting knife of my experience was made, so the owner said, from an old file.

From the start let me say that the operation of preparing an old knife for forging will make it cost more than a piece of cutlery steel of proper size, yet, for one knife, an old file is a very satisfactory way out.

First: Select an old file of standard make in a fine cut if possible. A smooth or dead-smooth file is best, because it causes less work while preparing for forging.

Second: Heat the file to a cherry red and place in a slow-cooling furnace or put it into a box of slaked lime and allow it to remain there until cold. This operation anneals the steel.

Third: Remove all traces of the cuts in the file on an emery wheel. Finish this grinding on a fine wheel. The steel should now be a smooth bar free from any signs of file cuts. If the steel is forged while the cuts are present you are sure to have cracks in the finished product if the steel is improperly forged. It is true that some may have forged knives from old files without removing the cuts but in these cases the cuts were removed by burning while the steel was improperly worked.

Fourth: Forge the steel to its proper shape. To do this, heat to a cherry red and forge with heavy blows until the steel nears its proper shape. Forge only until a dull red appears, then reheat. At no time should the steel be heated above a cherry red (1550 deg. F.) and then always in a slow carbonizing fire. Fast high heats may remove the carbon from the outside surfaces of the steel leaving, in thin stock, common iron which no one can temper. When the knife is nearly shaped, heat it to a cherry red and forge with light, fast blows until a dull red color is reached. Repeat this operation four times. Now normalize the steel by heating to a dull red and allowing it to cool slowly.

Fifth: Grind and file the knife to shape. Leave very little to be done later to produce a sharp edge. Now polish by hand, with emery cloth, or on a power buffer, until a fine finish has been obtained. The desired cutting edge should be secured while polishing.

Sixth: Harden the knife by heating to a dark cherry (1500

deg. F.) and quench in oil, edge down. Leave it in the oil until cold. Do not use an open fire for heating. Use a closed furnace or an arched forge fire or heat in a piece of gas pipe placed in an open fire. If the finest results are desired, use charcoal. For quenching oil, the best, of course, is a fine fish oil. This is expensive, however, and boiled linseed oil may be used instead, with satisfactory results. Next polish the knife once more, using caution while working as the knife is very brittle.

Seventh: Draw the temper to a blue color (550 to 560 deg. F.) and give the knife its final polish, proceeding as follows: Draw to a dark blue if a thin section, or a light blue if a heavy section, depending upon the hardness desired and the use for which the knife is intended. Draw in tempering oil if possible or in a lead-tin bath, the temperature of which you know to be correct. If these are not available, use a coal-gas flame or an oxyacetylene flame. Heat slowly, the thicker sections of the steel first, and watch the colors form until an even blue color is obtained. To draw an even color requires practice, and if you fail, harden the steel and try again.

To have a perfect color depends partly on the polishing. Have a fine clean finish free from fingermarks as these marks tend to change the colors or make them less distinct. It may be thought that these directions are a little extreme, but anything worth doing is worth doing well. If these directions are followed, a very fine cutting knife should result. It is understood that these directions are for the making of butcher knives, hunting knives, and general kitchen knives. Should one wish to make tools of greater fineness, such as razors, these directions would necessarily change. — *Jay F. Knowlton.*

SIZING TO PREVENT BLEEDING

990. Q.: I am building a model Napoleonic coach, using pattern pine for the body. I built one last year out of same material and was disappointed to find that pitch or rosin in the wood came through the finish. I tried orange shellac as an undercoater and also a special undercoater called Dux, put out by du Pont, but neither seemed to check it. Could you suggest a method that would correct this trouble? — *L.G.*

A.: The proper sizing material for a surface of this kind is one which is neutral to both the resinous sap content and any subsequent finish applied over the sizing. Satisfactory results may be had by making up a very thin glue, almost watery in consistency, from any casein glue like Casco. Let dry overnight and then sand with a split 6/0 garnet finishing paper which has been damped on the back and well crumpled, so as to soften it. Dust off and proceed to finish as desired. In case the sanding has cut through at any place, the spot should be touched up with some more size and a fine-haired brush. — *Ralph G. Waring.*

RELINING VIOLIN BACKS

995. Q.: Can you procure for me information as to the method of removal of a violin back for regluing, when broken loose only in places? Of course the joint may be pried open and glue inserted but I am told there is a method used to break down the old glue. — *A.L.P.*

A.: The method of heating the instrument to break down the wood-glue joints is frequently used in repair shops by expert workmen. It is not a method to be used by the novice. Instead, use a flexible putty knife, well honed, to gradually break down the old glue remaining. I seriously question the desirability of opening up all the joints since this will necessitate making a form for regluing in order to avoid distortion. It would be my method to carefully reglue break by break, protecting the wood from clamp injury with felt pads. You will appreciate my position, I am sure, and the difficulty in advising you without seeing the violin. In any case, go slowly and carefully about this repair, letting each new glue job have plenty of time to adjust itself before doing some other portion, preferably directly opposite. — *Ralph G. Waring.*

Associations, Conventions

INDUSTRIAL-ARTS CLUB MEETS IN NORTH TARRYTOWN, NEW YORK

The Industrial-Arts Club of Westchester county, New York, held its regular monthly meeting on Friday, May 24, in the North Tarrytown High School.

The program was of unusual merit. The Chevrolet Company, of North Tarrytown, presented some interesting educational talking pictures, taking up the history of the automobile and the process of manufacture of the different parts.

The Westchester Club was the first to be organized in the state and has been followed by the establishment of ten such clubs in various parts of the state. The club seeks to promote industrial-arts education and to promote good fellowship among the instructors.

At the business session, the following officers were elected for the year 1935: President, Wilbur H. Robinson, White Plains; vice-president, E. W. Manzer, Bronxville; treasurer, Leo Tyrrell, Yonkers; secretary, H. F. Lindstrom. — *E. W. Manzer.*

PITTSBURGH TRADE AND INDUSTRIAL EDUCATION ASSOCIATION

The Trade and Industrial-Education Association, Pittsburgh, Pa., entered upon its new year of work on June 1. The year 1934–35, just closed, was one of the most successful in the history of the association, under the leadership of Mr. Oscar J. Schwarm, president.

The association has a membership of 225 of whom a number have memberships in the state and national associations.

During the year 1934–35, a total of eight regular meetings were held, of which seven were dinner meetings and business meetings, with the annual frolic taking place in the Carnegie Union Building. The frolic was attended by 300 guests.

Honorary memberships were conferred upon E. H. Smith, of Carnegie Institute of Technology, and upon E. D. Hoyt and George Averill, of the Pittsburgh schools.

CALIFORNIA INDUSTRIAL-EDUCATION ASSOCIATION MEETS

The California Industrial-Education Association, which held its meeting July 5 and 6 in San Diego, took as its subject "The Progress and Future of Industrial Education." At the opening session in charge of Mr. J. C. Beswick, a talk on "Art in Printing" was given by Mr. Aaron Altmann, of San Francisco. The afternoon session, which was in charge of Mr. Howard Campion, of Los Angeles, took up trade and teacher-training topics.

At the general session on the second day, talks were given by Vierling Kersey, State Superintendent of Public Instruction, and by Dr. Edward Lee, Superintendent of Schools, San Francisco. Dr. H. A. Sotzin, of the San Jose State College, was chairman of the conference on "The Future of Industrial-Arts Education," in which a panel of seven experts took part.

The meeting closed with the election of officers for the next year. Samuel L. Fick, of Los Angeles, was elected president; Rolland Thomas, of Long Beach, vice-president; and George Courtney, of Los Angeles, was named secretary-treasurer.

News Notes

Stout Institute Summer School

The thirtieth summer session of The Stout Institute, at Menomonie, Wis., June 24 to August 2, was especially successful, with an attendance showing a comfortable margin of increase over that of last year. The school reported a total registration of 355 students from 21 states and the District of Columbia.

The excellent range of undergraduate work in industrial education, home economics, social science, English, and general education was continued and, in addition, graduate work was introduced. The registration in graduate work was 81 students. Of these, 57 were majors in industrial education, and 24 were majors in home economics.

(Continued on page 8A)

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(Continued from page 320)

An unusually strong schedule of speakers and conference leaders was present, including such well known men as Rollow W. Brown of Boston; LaVerne T. Ryder of the National Home Workshop Guild; V. J. Hydar of the Falk Corporation, Milwaukee; and Chris Jorgensen, of the Workers' Education Division of Wisconsin. A program of short-unit courses was offered, including a number of home economics, counseling, and practical conference methods.

The home-economics and industrial-education graduate students established a permanent organization during the summer.

School of Metal Craft and Industrial Arts

The William Dixon Model School for instruction in metal craft and industrial arts has been opened in New York City in response to a demand for a school of this type. The new school, which is located at 110 Fulton St., accommodates 100 pupils each day in four groups. Sessions of two-hour length are held in the morning, afternoon, and evening. The studio is equipped with model equipment representing the latest and best ideas in tooling, and the curriculum covers the making of jewelry, goldsmithing, silversmithing, coppersmithing, and pewter work. It also includes instruction in etching and engraving, lapidary, leatherwork, wood carving, clay modeling, and forming and casting in sand. A group of prominent artisans will give lectures from time to time.

Information concerning the school or its courses may be obtained by writing to William Dixon, Inc., 34 East Kinney St., Newark, N. J.

General Shop Training

During the school year 1935–36, the schools of Harlan, Ky., in co-operation with the vocational committee of the local Kiwanis Club, will offer general shop training and vocational guidance to students. Under the plan in operation last year, boys and girls were placed in different professions, trades, and businesses to learn about the particular type of work and to be given vocational guidance. As a part of the work, the head of the business was asked to take a special interest in the student along the line of vocational guidance and interest in the trade or profession.

New Publications

Beginning Problems in Mechanical Drawing

By Charles A. Bennett. Paper, 92 pages, 6 by 9, illustrated. Price, 48 cents. Published by The Manual Arts Press, Peoria, Ill.

A book of simple problems covering the units on lettering; use of T square, and triangles; use of the compass; and the making of working drawings. It is designed for boys of the junior-high-school level. The book contains a collection of simple problems from which the teachers may select those which will meet the need of their individual pupils.

Sixty Alphabets

By W. Ben Hunt and Ed. C. Hunt. Cloth, 120 pages, 6⅞ by 10⅜, illustrated. Price, $1.50. Published by The Bruce Publishing Company, Milwaukee, Wis.

This is the second edition of the authors' book on alphabets. It has been enlarged materially so that its former name *Fifty Alphabets* had to be changed. Besides the many aids which these helpful alphabets present to anyone interested in lettering, a geometrical analysis of the roman alphabet has been added. This addition will be especially valued by architects, artists, and draftsmen who are called upon to lay out the lettering for inscriptions to be used on buildings, murals, tablets, and the like.

Inventions, Patents and Trade Marks

By Milton Wright. Cloth, 310 pages, 5¾ by 8¼. Price, $3.10. Published by the McGraw-Hill Book Company, New York City.

This is the second edition of this manual on practical information on patent-office procedure. The book has been revised so that the material on trade marks, copyrights, and registration of commercial prints and labels is fully up to date.

(Continued on page 13A)

ADVERTISING PAGES REMOVED

(Continued from page 8A)

General Shop Electricity

By A. W. Dragoo, M.S., and K. L. Dragoo, B.E. Paper, 75 pages, 7⅞ by 10⅜, illustrated. Price, 60 cents. Published by McKnight & McKnight, Bloomington, Ill.

A brief course on electricity based upon the teaching and learning units as developed by the committee on standards of attainment in industrial-arts teaching of the American Vocational Association. The outline is based on six units: connecting up a simple bell system, making battery connections, wiring up lighting systems, making connections to the ordinary 110-volt house lighting current, making a buzzer, and constructing a telegraph system. The book also contains a number of projects which the student can build. Among these are: a code practice set; electromagnet; current detector; electrical thriller; magnetic motor; crystal radio set; burglar alarm; experimental transformer.

General Mechanical Drawing for Beginners

By Robert C. Woellner and Eugene C. Wittick. Cloth, 116 pages, 6⅛ by 9¼, illustrated. Price, $1.12. Published by Ginn and Company, Boston, Mass.

This course of mechanical drawing for beginners gives the student a survey of the field of graphic art. It contains chapters on sketching, working drawings, pictorial drawing, applied geometry, graphs and charts, developments, machine drawing, map drawing, furniture drawing, and architectural drawing. It also contains a chapter on duplicating methods and devices.

Progressive Drafting, Book I

By Jas. G. Sinclair. Paper, 94 pages, 7 by 9¼, illustrated. Price, 65 cents. Published by the Clarke & Stuart Company, Ltd., Vancouver, B. C.

The author of this book aims to present a fundamental basis for engineering and shop drawing without becoming too involved in the technical aspects of any particular type of drawing. The book is to meet the requirements of junior and senior high schools and junior and senior technical high schools. The course contains a large number of geometrical problems, as well as sections on orthographic projections and on the principles of development.

Shop Projects in Electricity

By Herbert G. Lehmann. Cloth, 190 pages, 6½ by 8¾, illustrated. Published by the American Book Company, New York, N. Y.

This book provides a series of 21 practical projects for the electrical shop. The approach is that of illustrating through construction the main electrical principles involved in the compass, the galvanometer, electromagnets, bells and buzzers, the telegraph, the arc light, transformer, the motor, and the radio receiver. Each unit includes in addition to a bill of materials and complete detailed drawings, a statement concerning the operation of the project.

Problems in Sheet Metal Work

By DeWitt Hunt and others. Paper, 50 pages, 8½ by 11, illustrated. Published by the Oklahoma Agricultural and Mechanical College, Stillwater, Okla.

The price of this book is 75 cents, not 57 cents as was announced in a previous review.

Course-Making in Industrial Education

By John F. Friese, 150 W. Prospect Ave., State College, Pa. Paper, 175 pages, 8½ by 11, illustrated. Price, $1.50. Published by the author.

This book was reviewed in the July, 1935, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. It may be obtained by writing to the author at the address given.

Metal Work for Senior Schools

By H. T. Jones and W. T. Barber. Cloth, 128 pages, 6¾ by 8½, illustrated. Price, $1.50. Published by Pitman Publishing Corporation, New York City.

The work outlined is planned for three years. It covers benchwork, sheet metal, craftwork, and forging. The book contains quite a number of interesting projects. Printed as

(Continued on page 15A)

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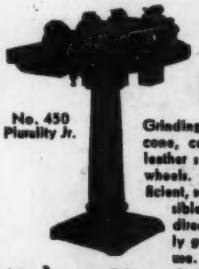

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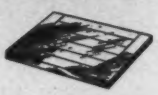

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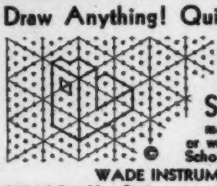

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(Continued from page 13A)

it is in Great Britain, the shop terms used may not be acceptable in the teaching of this subject matter in the American schools.

Home Craftsmanship

By Emanuele Stieri. Cloth, 346 pages, 6¼ by 9¼, illustrated. Price, $2.50. Published by the McGraw-Hill Book Company, New York City.

The book describes the various materials used by the home craftsman. It also gives home-shop layouts, describes the tools that the home craftsman should have for working with wood and metal.

Part II of the book gives a number of projects for the house and garden in wood and metal.

Woodworker's Turning and Joining Manual

By the Editorial Staff of the Popular Science Monthly. Cloth, 192 pages, 5⅛ by 7⅝, illustrated. Published by Popular Science Publishing Company, Inc., New York City.

A little manual for the home craftsman. It contains chapters on the equipping of the home workshop, sharpening of tools, hand-tool operations, power tools, wood turning, veneering, and wood finishing.

Vocational Guidance in Engineering Lines

Edited by J. A. L. Waddell, Frank W. Skinner and Harold E. Wessman. Cloth, 521 pages, 6⅛ by 9⅛, illustrated. Price, $2.50. Published by The Mack Printing Company, Easton, Pa.

This exceedingly helpful volume was prepared under the auspices of the American Association of Engineers. A long list of men prominent in engineering enterprises, have written the separate chapters devoted to the numerous branches into which engineering is now divided.

(Continued on page 16A)

SchoolShopEquipmentNews

A STORY OF VENEERS

The Veneer Association, 616 South Michigan Ave., Chicago, Ill., has issued a 94-page booklet, entitled *Faces and Figures*, in which it tells the story of veneers, starting from the tombs of the Ptolemies to the present time. It takes you behind the scenes and shows the broad sweep of the industry from forest to retail market. While the booklet is not an exhaustive treatise on veneers and plywoods, it does tell the story objectively and clearly.

The booklet shows how veneers are matched, balanced, and converted into symmetrical effects, how logs are sawed and spliced into veneers, how the figure, grain, and coloring are produced by a certain manufacturing process involving natural and artificial forces, and how art, science, and glue combine to achieve works of lasting beauty. The last part of the booklet is devoted to illustrations of typical products made from fine veneers and to illustrations of a variety of figures in veneers.

ANNOUNCE NEW CLAMP CATALOG

The Hartford Clamp Company, of East Hartford, Conn., has issued a 16-page booklet, describing and illustrating its line of single- and double-bar clamps. The catalog lists the improved locking single- and double-bar clamps, the deep-engagement clamp locking device, the quick-adjusting, self-locking, and unlocking double-bar clamps, the self-locking and unlocking adjustable single-bar clamps, the clamp and edge clamp attachment, the wood-bar-clamp fixtures, the No. 75 column and miter clamps, the self-locking and unlocking radius clamps, the double-screw hand clamps, and the pipe-clamp fittings and No. 55 bar clamps.

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(Continued on page 16A)

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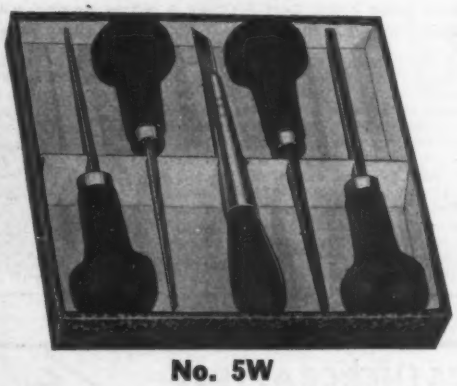

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(Continued from page 15A)

Art Education in Principle and Practice

By Walter H. Klar, Leon L. Winslow, and C. Valentine Kirby. Cloth, 422 pages, 5⅞ by 8⅜, illustrated. Price, $2.50. Published by Milton Bradley Company, Springfield, Mass.

This book is specially designed for the art teacher or the one who is preparing to teach art. It is helpful in deciding upon the objectives of the art course, how to organize it, how to integrate it with the other subjects taught, how to supervise, and how to evaluate the work of art teachers. It also gives supply lists, art-room arrangements, and directions for the selection of textbooks, arrange exhibits, and the like.

How to Draw the Head in Light and Shade

By Edward Renggli. Cloth, 5½ by 8¾. Price, $1. Published by Bridgman Publishers, Pelham, N. Y.

This is the third edition of this little book which contains definite instructions for the draftsman interested in drawing the human head. The book also contains many interesting and helpful illustrations.

Public Speaking Simplified

By C. W. Chamberlain, Ph.D. Cloth, 142 pages, 5 by 7¼. Price, $1.00. Published by Schnepp and Barnes, Springfield, Ill.

Many shop teachers will welcome this little volume. Its homely advice will be of great assistance to them in preparing themselves for the public and semi-public speaking in which all teachers more or less have to engage.

Low-Pressure Selling

By Jas. A. Worsham. Cloth, 223 pages, 5¼ by 7⅜. Price, $2.50. Published by The Midwest Press, Bloomington, Ill.

While this little volume is written specially for the salesman, nevertheless it contains a great deal of very good information for the shop teacher who also is confronted with a selling job of no mean proportions.

The Golden Flute

By Alice Hubbard and Adeline Babbitt. Cloth, 320 pages, 5¾ by 8¼. Price, $3. Published by The John Day Company, New York City.

While this is not a book which will be found useful in the school shop, nevertheless there are many shop teachers who will be delighted to read to their own youngsters, or have their children read for themselves the many juvenile poems that the authors have collected in this volume.

Boats, Airplanes and Kites

By Armand J. La Berge. Cloth, 132 pages, 7¾ by 10, illustrated. Price, $2.00. Published by The Manual Arts Press, Peoria, Illinois.

This book, especially written for the junior-high school is composed of three parts.

Part I contains descriptions and plans for a number of model sailing yachts and power boats.

Part II is devoted to model airplanes, seven of which are featured.

Part III is devoted to kites, five different types being shown.

The book also covers a description of regattas and kite tournaments that have been held in Minnesota, the home of the author.

The book is well illustrated, and the methods of shaping the hulls of the model boats out of solid blocks are shown step by step. The making of model airplanes and kites is also carefully described.

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